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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This set of twelve FORTRAN subroutes will convert the coordinates of a point given in geographic, military, state planar, or Universal Transverse Mercator form to coordinates represented in a second form chosen from the four coordinate types.

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POTOMAC RESEARCH, INCORPORATED
McLEAN, VIRGINIA 22101

SPECIAL TECHNICAL REPORT IR 78.01 (MARCH 1978)

MAP COORDINATE CONVERSION

By H. O. EBERHART

Prepared For:

Department of the Army
Chemical Systems Laboratory
Development Support Division
Scientific & Engineering Applications Branch

Contract Number: DAAK11-77-C-0112
Installation Restoration Data Base Management

80 5 22 047

Abstract:

This set of twelve FORTRAN subroutines will convert the coordinates of a point given in geographic, military, state planar, or Universal Transverse Mercator form to coordinates represented in a second form chosen from these four coordinates types.

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October 4, 1978

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New Pages	Date
8 – 9*	October 4, 1978
18 – 18a*	October 4, 1978
unpaged (2)* (Appendix B)	

*New pages

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1.0   INTRODUCTION

In the Installation Restoration (IR) program measurements of variables such as depth to top of interval in a coring must be related to a specific location on the earth's surface. This is accomplished through the use of coordinates: geographic, state planar, Universal Transverse Mercator, and military. Each installation will use that coordinate system which is most convenient; therefore, the programmer will be concerned with conversion from one coordinate system to another. This manual will show you how to use the subroutine package. If you understand the above coordinate systems, you may skip section 2.

Note: Your comments on this manual can help improve it; please direct all comments to Potomac Research, Inc., at our Edgewood Area office.

2. LOCATING POINTS

2.0 General

The earth's surface is considered to result from the rotation of an ellipse about the north-south polar axis. This solid is called the spheroid. The Clarke 1866 spheroid is currently used for the continental United States. Dimensions are shown below:

a = semimajor axis
    6,378,206.4 meters
b = semiminor axis
    6,356,583.8 meters
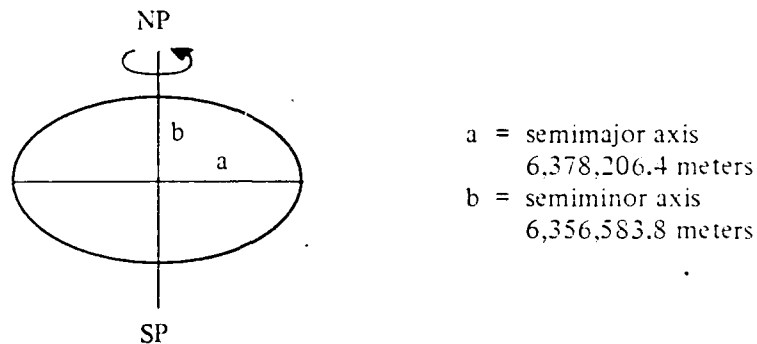
Figure 1. Clarke 1866 Spheroid

A point such as position A in Figure 2 is located by describing it in terms of two numbers called coordinates.

Geographic coordinates can be related to the spheroid alone by means of the formulae of geodesy. For the other coordinate systems, the point A has been transferred from the spheroid to a map projection. The map projection is a flattening of the surface upon which the spheroid is projected according to the projection type. We desire a flat surface because it is easier to work with than a curved surface.

To locate that point A in Figure 2, we measure its signed distances from two lines called axes and record the numbers in order as the coordinates of A. Our x and y axes will always intersect at an angle of 90°.
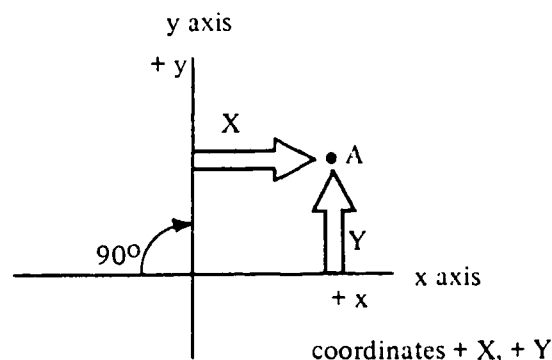
coordinates + X, + Y

Figure 2. General Coordinate System

2.1 Geographic Coordinates

On the spheroid the axes are curved lines. The x axis is the circle equidistant from the North and South Poles named the Equator. The y axis is that half-ellipse through the North and South Poles that passes through Greenwich, England, named the Prime Meridian. Distances are measured in degrees, minutes, and seconds of arc. We shall measure from 0 to 90° north or south of the Equator and shall call this coordinate latitude. We shall measure from 0 to 180° west or east of the Prime Meridian and shall call this coordinate longitude. The precision of our measurements shall be to the nearest 0.01 second.

Geographic coordinates of point A are written like the following example:

39° 23' 51.37"N   76° 18' 06.63" W

Sometimes, you will see these symbols:

ϕ, latitude

λ, longitude

Also, geographic coordinates may be called geodetic.

2.2 State Planar Coordinates

Two types of projections are used in the state planar coordinate system:

Lambert projection — "wide" state such as Connecticut

Transverse Mercator projection — "tall" state such as Vermont

It may require more than one projection to cover a state, as the width is limited to 158 miles. Thus, a state may be divided into areas of coverage called zones, which have been coded as four-digit numbers in subroutine FLALFA and ZONE2. The y axis is the central meridian of the projection: it is assigned a large positive number so that no coordinate will have a negative value. Its equation is x = p. The x axis is a line perpendicular to the y axis and it is sufficiently south of the zone so that no y coordinate will have a negative value. Its equation is y = 0. We shall measure distance in feet from the y axis to point A; call this distance X^1. X coordinate is

$$X = p \pm X^1$$

Note: Use + if point A is east of the central meridian; use − if point is west.

We shall measure distance in feet from the x axis to point A and shall call this coordinate Y.

State planar coordinates of point A are written like the following example:

Zone 4126   X = 997,307   Y = 570,443
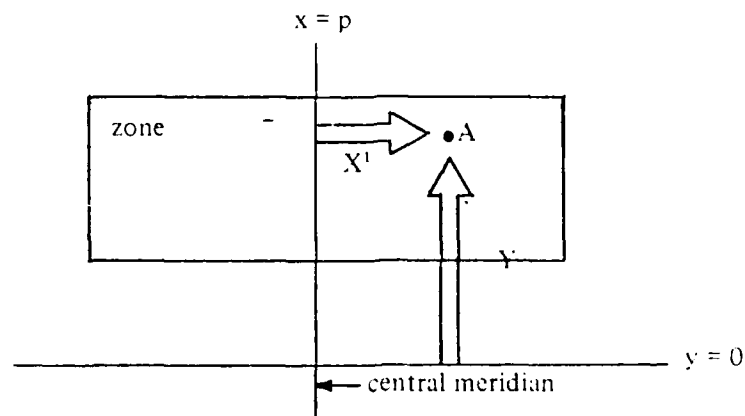
Figure 3. State Planar Coordinate System

2.3   Universal Transverse Mercator Coordinates

The Universal Transverse Mercator (UTM) projection is used from 80°S through 84°N latitude. The earth is divided into 60 zones 6° wide starting at 180°W longitude and proceeding east. Zones are numbered from 1 to 60 as in Figure 4.
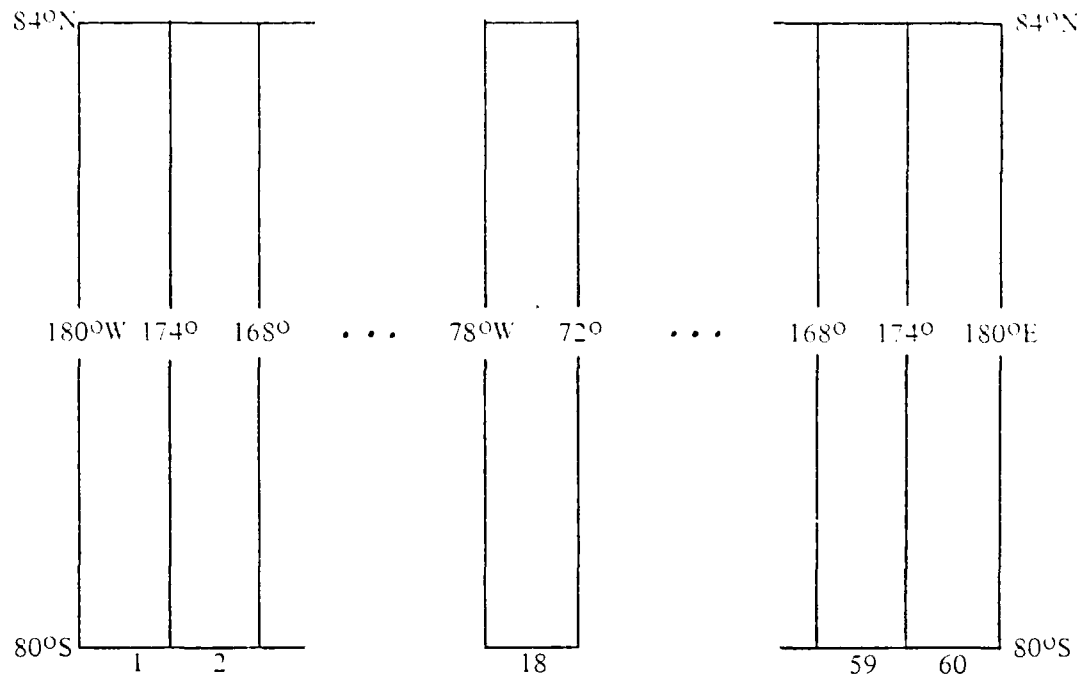
Figure 4. UTM Zones

The y axis of each zone is its central meridian; it is assigned a value of 500,000 meters. Its equation is $E = 500,000$.

The x axis of each zone is the Equator; in the northern hemisphere, it is assigned a value of 0 meters; in the southern hemisphere, 10,000,000 meters. Its equation is $N = 0$ (northern); $N = 10,000,000$ (southern). We shall measure distance in meters from the y axis to point A; call this distance E^1. The false easting coordinate is .

$$E = 500,000 \pm E^1$$

Note: Use + if point A is east of central meridian; use – if point A is west.

We shall measure distance in meters from the x axis to point A and shall call this northing distance N^1. The false northing coordinate is

$$N = N^1 \qquad \text{(northern hemisphere)}$$
$$\text{or} \quad N = 10,000,000 - N^1 \quad \text{(southern hemisphere)}$$

UTM coordinates of point A are written like the following example:

$$\text{Zone } +18 \quad E = 387,900 \qquad N = 4,361,500$$

Note: + zone means northern hemisphere
         – zone means southern hemisphere

2.4   Military Coordinates

Military coordinates are based on the UTM system described in section 2.3. Each zone is divided into 8° high areas called quadrangles except from 72°N to 84°N where the quadrangle is 6° x 12°. The row dimension of a quadrangle is lettered from C through X (omitting I and O) as in Figure 5. A quadrangle is identified by zone number and row.
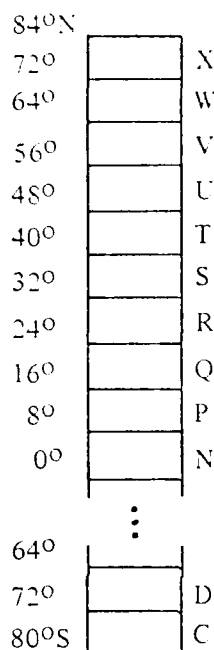
Figure 5. Quadrangles of a UTM Zone

These quadrangles are then divided into squares which have 100,000 meters on each side. A 100,000-meter square is identified by two letters: x designator, y designator. Compute r = MOD (zone, 3)*. If r equals 0, then the x designator is lettered S through Z proceeding east; if r equals 1, then it is lettered A through H; if r equals 2, then it is lettered J through R (omitting O).

If the UTM zone is odd, then the y designator is lettered L through V, A through K (omitting I and O) starting at a multiple of 2,000,000 meters and proceeding north; if the UTM zone is even, then it is lettered R through V, A through Q (omitting I and O) as in Figure 6.

---

*Fortran MOD function.

500,000 Meters

40°N

TV	UV	VV	WV	XV	YV
TU	UU	VU	WU	XU	YU
TT	UT	VT	WT	XT	YT
TS	US	VS	WS	XS	YS
TR	UR	VR	WR	XR	YR
TQ	UQ	VQ	WQ	XQ	YQ
TP	UP	VP	WP	XP	YP
TN	UN	VN	WN	XN	YN
TM	UM	VM	WM	XM	YM
TL	UL	VL	WL	XL	YL

Row S (from 32°N to 40°N)

4,000,000 Meters

32°N

75°W

Zone 18
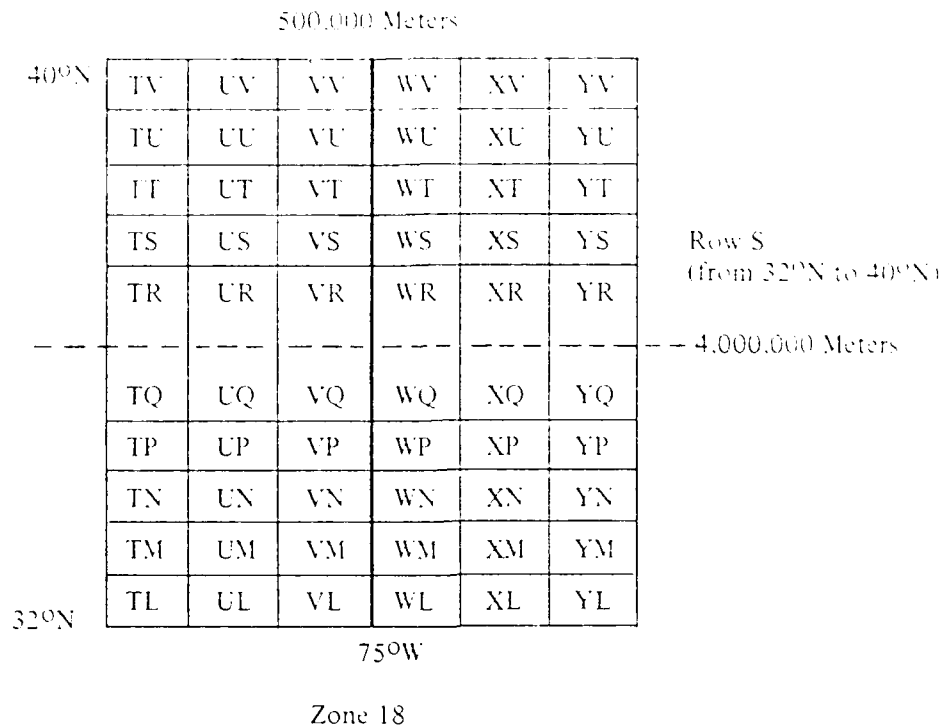
Note: Because of convergence of the meridians, letters S and Z have been cut off.

Figure 6. 100,000-Meter Squares of an Even Zone

Since the point A has been located within 100,000 meters by means of zone number, quadrangle row, and 100,000-meter square, we use only part of the easting and northing coordinates; viz., the rightmost five digits of each.

Military coordinates of point A are written as a character string using the elements discussed above from left to right like the following example:

18SUU8790061500

For readability, the coordinates above may be separated:

18   SUU   8790061500

Note: + UTM zone means northern hemisphere
        - UTM zone means southern hemisphere

This sign is returned as a bonus from the appropriate subroutine; it is not needed except in level 2 and 3 subroutines.

3. USER PROCEDURES

3.0 General

For each type of coordinate conversion, one subroutine has been provided so that the subroutine call will be shorter than that arising from one general purpose subroutine.

    a. Use this UNIVAC control statement:

        LIB   IR*CVCOORD.   (with @MAP)

    b. Name the subroutine which you desire to call:

        COORxy

where COORxy will convert from type x to y

    x, y is one of the letters G, S, M, U

    (G = geographic, S = state planar, M = military, U = UTM).

    c. Check the calling sequence in sections 3.1 through 3.12. Be sure that your input data conform to the formats shown therein: e.g.*, longitude LAM is one double precision number formed from degrees, minutes, and seconds:

        76°18'6.63"W   0761806.63D0

        (longitude format = dddmmss.ssD0)

    d. Use Table I to get your installation input code (INST).

    e. After each subroutine call, test the error code (JERR) returned. If JERR equals 0, then the conversion has been successful; if JERR does not equal 0, then use Table III to find your error.

---

*Also, these variables must be in the correct format: latitude PHI (similar to LAM), quadrangle row and 100,000-meter square QSQ (3 letters), military coordinate string XYMIL (10 digits D.P.).

Table I. Installation Codes

Code	Installation
AL	Alabama Army Ammunition Plant
BA	Badger Army Ammunition Plant
EA	Edgewood Area
FA	Frankford Arsenal
HA	Hawthorne Naval Ammunition Depot
LS	Lone Star Army Ammunition Plant
PB	Pine Bluff Arsenal
RA	Redstone Arsenal
RM	Rocky Mountain Arsenal
VO	Volunteer Army Ammunitions Plant
WS	Weldon Spring Chemical Plant

Table II. Zone Numbers (provided in subroutine ZONE2)

Installation	State Zone	UTM Zone
AL	3101	+16
BA	5751	+16
EA	4126	+18
FA	5151	+18
HA	4651	+11
LS	5351	+15
PB	3251	+15
RA	3101	+16
RM	3451	+13
VO	5301	+16
WS	4401	+15

Note. I = input variable, 0 = output variable

3.1   Geographic to Military Coordinates.

CALL COORGM (INST, PHI, LAM, UZONE, QSQ, XYMIL, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
PHI	--	I D. P.	LATITUDE
LAM	--	I D. P.	LONGITUDE

UZONE	--	0 INTEGER	+ OR – UTM ZONE NUMBER
QSQ	--	0 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	0 D. P.	COORDINATE STRING, MIL.
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.2   Geographic to State Planar Coordinates

CALL COORGS (INST, PHI, LAM, SZONE, XSTP, YSTP, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
PHI	--	I D. P.	LATITUDE
LAM	--	I D. P.	LONGITUDE

SZONE	--	0 INTEGER	STATE ZONE NUMBER
XSTP	--	0 D. P.	X COORDINATE, STATE
YSTP	--	0 D. P.	Y COORDINATE, STATE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.3   Geographic to UTM Coordinates.

CALL COORGU (INST, PHI, LAM, UZONE, EAST, NORTH, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
PHI	--	I D. P.	LATITUDE
LAM	--	I D. P.	LONGITUDE

UZONE	--	0 INTEGER	+ OR –UTM ZONE NUMBER
EAST	--	0 D. P.	EASTING
NORTH	--	0 D. P.	NORTHING
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.4   Military to Geographic Coordinates.

CALL COORMG (INST, QSQ, XYMIL, H1, PHI, H2, LAM, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	I HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	I D. P.	COORDINATE STRING, MIL.

H1	--	0 HOLLERITH	HEMISPHERE (N or S)
PHI	--	0 D. P.	LATITUDE
H2	--	0 HOLLERITH	HEMISPHERE (W or E)
LAM	--	0 D. P.	LONGITUDE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.5   Military to State Planar Coordinates.

CALL COORMS (INST, QSQ, XYMIL, SZONE, XSTP, YSTP, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	I HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	I D. P.	COORDINATE STRING, MIL.

SZONE	--	0 INTEGER	STATE ZONE NUMBER
XSTP	--	0 D. P.	X COORDINATE, STATE
YSTP	--	0 D. P.	Y COORDINATE, STATE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.6   Military to UTM Coordinates.

CALL COORMU (INST, QSQ, XYMIL, UZONE, EAST, NORTH, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	I HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	I D. P.	COORDINATE STRING, MIL.

UZONE	--	0 INTEGER	+ OR – UTM ZONE NUMBER
EAST	--	0 D. P.	EASTING
NORTH	--	0 D. P.	NORTHING
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.7   State Planar to Geographic Coordinates.

CALL COORSG (INST. XSTP. YSTP. H1. PHI. H2. LAM. JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I. page 9)
XSTP	--	I D. P.	X COORDINATE. STATE
YSTP	--	I D. P.	Y COORDINATE. STATE

H1	--	O HOLLERITH	HEMISPHERE (N or S)
PHI	--	O D. P.	LATITUDE
H2	--	O HOLLERITH	HEMISPHERE (W or E)
LAM	--	O D. P.	LONGITUDE
JERR	--	O INTEGER	ERROR CODE (Table III. page 15)

3.8   State Planar to Military Coordinates.

CALL COORSM (INST, XSTP, YSTP, UZONE, QSQ, XYMIL, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I. page 9)
XSTP	--	I D. P.	X COORDINATE. STATE
YSTP	--	I D. P.	Y COORDINATE. STATE

UZONE	--	O INTEGER	+ OR –UTM ZONE NUMBER
QSQ	--	O HOLLERITH	QUADRANGLE ROW & 100.000-M. SQUARE
XYMIL	--	O D. P.	COORDINATE STRING, MIL.
JERR	--	O INTEGER	ERROR CODE (Table III, page 15)

3.9   State Planar to UTM Coordinates.

CALL COORSU (INST. XSTP, YSTP, UZONE. EAST, NORTH, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
XSTP	--	I D. P.	X COORDINATE, STATE
YSTP	--	I D. P.	Y COORDINATE. STATE

UZONE	--	O INTEGER	+ OR – UTM ZONE NUMBER
EAST	--	O D. P.	EASTING
NORTH	--	O D. P.	NORTHING
JERR	--	O INTEGER	ERROR CODE (Table III, page 15)

3.10   UTM to Geographic Coordinates.

CALL COORUG (INST, EAST, NORTH, H1, PHI, H2, LAM, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	I D. P.	EASTING
NORTH	--	I D. P.	NORTHING

H1	--	0 HOLLERITH	HEMISPHERE (N or S)
PHI	--	0 D. P.	LATITUDE
H2	--	0 HOLLERITH	HEMISPHERE (W or E)
LAM	--	0 D. P.	LONGITUDE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.11   UTM to Military Coordinates.

CALL COORUM (INST, EAST, NORTH, UZONE, QSQ, XYMIL, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	I D. P.	EASTING
NORTH	--	I D. P.	NORTHING

UZONE	--	0 INTEGER	+ OR - UTM ZONE NUMBER
QSQ	--	0 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	0 D. P.	COORDINATE STRING, MIL.
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.12   UTM to State Planar Coordinates

CALL COORUS (INST, EAST, NORTH, SZONE, XSTP, YSTP, JERR)

INST	--	I HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	I D. P.	EASTING
NORTH	--	I D. P.	NORTHING

SZONE	--	0 INTEGER	STATE ZONE NUMBER
XSTP	--	0 D. P.	X COORDINATE, STATE
YSTP	--	0 D. P.	Y COORDINATE, STATE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.13 Example.

You have an input file of well locations in state planar coordinates from Rocky Mountain Arsenal. The following program fragment will convert them to UTM coordinates:

```
      INTEGER               UZONE
      DOUBLE PRECISION      E, N, XSTP, YSTP

200 READ (5,3177, END=9000) XSTP, YSTP

      WRITE (6,3105) XSTP, YSTP

      CALL COORSU (2HRM, XSTP, YSTP, UZONE, E, N, JERR)

      IF (JERR, EQ, 0) WRITE (6,3105) E, N

      GOTO 200

9000 CONTINUE
```

Table III. Error Codes Returned by Subroutine

Error Code (JERR)	Explanation	In Subroutine:
0	No errors!	COOR__
1	INVALID INSTALLATION	COOR__
2	MISSING INPUT COORDINATES	COOR__
3	MISSING 3 LETTERS -- QUADRANGLE ROW & 100,000-M. SQUARE	COOR__
10	UTM ZONE NUMBER > 22 WITH CLARKE 1866 SPHEROID	CONVMU
11	INVALID ROW LETTER OF 6° X 8° QUAD-RANGLE (MUST BE N THROUGH X)	CONVMU
12	INVALID X DESIGNATOR OF 100,000-M. SQUARE (SEE PAGE 6)	CONVMU
13	INVALID Y DESIGNATOR OF 100,000-M. SQUARE (SEE PAGE 6)	CONVMU
14	INVALID NORTHING WITH CLARKE 1866 SPHEROID	CONVMU
15	LATITUDE > 84°	TMFWD
16	LONGITUDE > 0.16 RADIANS	TMFWD
17	GRID DISTANCE FROM CENTRAL MERIDIAN > 0.2a WHERE a = semimajor axis of spheroid	TMINV

Table III. Error Codes Returned by Subroutine – Continued

18	RECTIFYING LATITUDE > 1.47 RADIANS	TMINV
19	INVALID STATE ZONE NUMBER	CONVGS
20	LATITUDE $\geqslant 80° 30'$	UTMFW
21	NORTHING > 8,942,900 M.	UTMIVS

4. TEST PLAN

The twelve subroutines were tested separately on one point within each installation.

Results were then compared with the coordinates measured from the map for that installation. Results were in agreement.

Additionally, cycles of forward and backward conversions such as G to S, S to G, etc., were tested. Results agreed within accuracies of 0.0005 meter, 1.2 feet, or 0.02 seconds.

TEST POINTS

(Coordinates are listed in the order geographic, state, UTM, military.)

Aberdeen Proving Ground (Edgewood Area)

39° 23' 51.37"N	76° 18' 6.63"W	
State zone 4126	X = 997,307	Y = 570,443
UTM Zone + 18	E = 387,900	N = 4,361,500
+ 18 SUU	8790061500	

Badger Army Ammunition Plant

43° 22' 0.08"N	89° 45' 7.92"W	
State zone 5751	X = 2,065,894	Y = 498,207
UTM Zone +16	E = 277,000	N = 4,805,000
+16 TBD	7700005000	

Frankford Arsenal

40° 1' 3.31"N	75° 2' 48.74"W	
State zone 5151	X = 2,757,015	Y = 260,846
UTM Zone +18	E = 496,000	N = 4,429,500
+18 TVV	9600029500	

Pine Bluff Arsenal

34° 19' 0"N	92° 6' 0"W	
State zone 3251	X = 1,969,804	Y = 600,410
UTM Zone +15	E = 582,806	N = 3,797,439
+15 SWH	8280697439	

Redstone Arsenal

    34° 40' 0"N   86° 38' 0"W

    State zone 3101   X = 259,433   Y = 1,516,828

    UTM Zone +16   E = 533,595   N = 3,835,943

    +16 SEP   3359535943

Rocky Mountain Arsenal

    39° 47' 54.99"N 104° 54" 10.98"W

    State zone 3451   X = 2,167,734   Y = 170,047

    UTM Zone +13   E = 508,300   N = 4,405,200

    +13 SEQ   0830005200

Weldon Spring Chemical Plant

    38° 41' 49.40"N 90° 43' 44.49"W

    State zone 4401   X = 434,636   Y = 1,042,715

    UTM Zone +15   E = 697,500   N = 4,285,400

    +15SXN   9750085400

Alabama Army Ammunition Plant

    33° 19' 59.99" N 86° 19' 0" W

    State zone 3101   X = 352,369   Y = 1,031,023

    UTM zone +16   E = 563,595   N = 3,688,257

    +16 SEM   6359588257

Hawthorne Naval Ammunition Depot

    38° 34' 9.13" N 118° 36' 49.97"W

    State zone 4651   X = 491,266   Y = 1,390,319

    UTM zone +11   E = 359,400   N = 4,270,000

    +11 SLN   5940070000

Lone Star Army Ammunition Plant

    33° 26' 0" N 94° 13' 0" W

    State zone 5351   X = 3,001,488   Y = 658,370

    UTM zone +15   E = 386.897   N = 3,699,797

    +15 SUG   8689799797

Volunteer Army Ammunition Plant

35° 5′ 10.90″ N 85° 8′ 34.41″ W

State zone 5301   X = 2,256,446   Y = 253,889

UTM zone +16   E = 669,300   N = 3,884,000

+16 SFP   6930084000

5. PROGRAMMING NOTES

5.0 General

The twelve basic subroutines use subroutines adapted from program DP154 and J38 written by the U. S. Geological Survey. Subroutine CONVMU was developed by Potomac Research, Incorporated.

Subroutines are organized into three hierarchical levels as follows:

Level 1:

COORGM	COORGS	COORGU	COORMG
COORMS	COORMU	COORSG	COORSM
COORSU	COORUG	COORUM	COORUS

Level 2:

CONVGU	CONVGS	CONVMU	ZONE2

Level 3:

TMCOF	FLALFA	STOD	OBMER
TMINV	FILA	UTMFW	OBMINV
TMFWD	FILLA	UTMIVS	GTPLAM
	FILLAA	LAMFRD	PTGLAM
	FILLBB	LAMINV	

Subroutines with the name COOR - - perform the conversion in one direction; subroutines with the name CONV- - , in two directions.

Subroutine functions are as follows:

Subroutine Name	Function
COORGM	Convert geographic to military coord.
COORGS	Convert geographic to state coord.
COORGU	Convert geographic to UTM coord.
COORMG	Convert military to geographic coord.
COORMS	Convert military to state coord.
COORMU	Convert military to UTM coord.

Subroutine Name	Function
COORSG	Convert state to geographic coord.
COORSM	Convert state to military coord.
COORSU	Convert state to UTM coord.
COORUG	Convert UTM to geographic coord.
COORUM	Convert UTM to military coord.
COORUS	Convert UTM to state coord.
CONVGS	Convert geographic to state coord. and vice versa
CONVGU	Convert geographic to UTM coord. and vice versa
CONVMU	Convert military to UTM coord. and vice versa
GTPLAM	Convert geographic to state coord. (Michigan Lambert)
PTGLAM	Convert state to geographic coord. (Michigan Lambert)
FLALFA	Fill ALPHA ( ) array with state zone info
FILA	Fill A ( ) array – 2 dim
FILLA	Fill A ( ) array – 2 dim
FILLAA	Fill A ( ) array – 3 dim
FILLBB	Fill B ( ) array – 3 dim
LAMFRD	Convert geographic to state coord. (Lambert)
LAMINV	Convert state to geographic coord. (Lambert)
OBMFR	Convert geographic to state coord. (Oblique Mercator)
OBMINV	Convert state to geographic coord. (Oblique Mercator)
STOD	Convert seconds to deg-min-sec
TMCOF	Compute coefficients in A ( ) array
TMFWD	Convert geographic to UTM coord.
TMINV	Convert UTM to geographic coord.

Subroutine Name	Function
UTMFW	Convert geographic to state coord. (trans. Mercator)
UTMINS	Convert state to geographic coord. (trans. Mercator)
ZONE2	Find state and UTM zones, hemisphere indicators.

Conventions adhered to within these subroutines:

Clarke 1866 spheroid

+ LATITUDE   NORTHERN HEMISPHERE

- LATITUDE   SOUTHERN HEMISPHERE

+ LONGITUDE   WESTERN HEMISPHERE

- LONGITUDE   EASTERN HEMISPHERE

+ UTM ZONE   NORTHERN HEMISPHERE

- UTM ZONE   SOUTHERN HEMISPHERE

5.1   Modifying the Subroutines.

(* means a moderate programming effort is required.)

a.   To add another installation: Add installation code to IALF ( ), hemisphere indicators to HSIGN1 ( ) and HSIGN2 ( ), state zone number from subroutine FLALFA to ISZ ( ), and the UTM zone to IUZ ( ). The above arrays are contained in subroutine ZONE2.

b.   To add a spheroid*: Change each subroutine COORxy so that it will have a new argument, JSPHER (spheroid type). Use the spheroid types contained in subroutine CONVGU. Subroutine

CONVGS will have to be changed to recognize spheroid type. Apparently, numerical information concerning the spheroid is stored in arrays called A (2 dim), A (3 dim), and B (3 dim).

Array	In Labeled Common	In Subroutine
A (2 dim)	CONST	FILA, FILLA
A (3 dim)	OMF	FILLAA
B (3 dim)	OMI	FILLBB

APPENDIX A

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      "Geodesy"
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3.   Department of the Army

      Field Manual 21-26, Map Reading

      Technical Manual 5-241-1, Grids and Grid References

      Technical Manual 5-241-8, Universal Transverse Mercator Grid

      Technical Manual 5-241-9, Universal Polar Stereographic Grid Tables

4.   Department of Commerce
      National Oceanic and Atmospheric Administration
      National Geodetic Survey, Rockville, MD 20852

      C&GS Special Publication 235, The State Coordinate Systems (Rev. 1974)

5.   C. E. Ewing & M. M. Mitchell, Introduction to Geodesy, Elsevier (1970).

APPENDIX B

COMPUTER PROGRAM SOURCE LISTINGS

```
FILE LISTER  05/17/78  08:29:22
END FLIST  67 CARDS GENERATED.

@HDG.P  ******  CONVGS  ******

@FOR.S CVCOORD.CONVGS,TPF$.CONVGS
FOR S0E3-05/17/78-08:29:41 (0.)

SUBROUTINE CONVGS    ENTRY POINT 000552

STORAGE USED: CODE(1) 000676: DATA(0) 000152: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003   CONST   010150
0004   BLK1    003636

EXTERNAL REFERENCES (BLOCK, NAME)

0005   FILA
0006   FLALFA
0007   FILLA
0010   LAMFRD
0011   GTPLAM
0012   FILLAA
0013   UIMFW
0014   OBMER
0015   LAMINV
0016   FILLBB
0017   UIMIVS
0020   ORMINV
0021   PTGLAM
0022   STOD
0023   NERR2$
0024   NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001   000213 100L    0001   000240 115L    0001   000257 120L    0001   000316 140L    0001   000925 160L
0001   000336 170L    0001   000356 180L    0001   000377 190L    0001   000435 210L    0001   000451 215L
0001   000463 220L    0001   000127 50L     0001   000133 60L     0001   000507 9000L    0001   000517 9040L
0001   000522 8060L   0001   000525 9200L   0001   000531 9300L   0001   000541 9999L    0000 D 000000 A
0000 R 000113 ADG     0000 R 000025 ALF3    0000 R 000066 ALF4    0000 R 000000 ALPHA   0000 R 000114 ATIN
0000 R 000104 EAST    0000 D 000077 EF      0000 R 000100 EM      0000 R 000004 FAC     0000 R 000073 FT1
0000 I 000074 FT2     0000 D 000002 IL      0000 R 000137 INJP$   0000 I 000107 IZZ     0000 I 000106 J
0000 I 000105 K       0000 I 000110 KK      0000 D 000010 LAM     0000 D 000014 LAMR    0000 R 000105 LBT
0000 R 000001 MINUS   0000 R 000102 OBL     0000 D 000006 PHI     0000 D 000012 PHIR    0000 R 000075 RR1
0000 R 000076 RR2     0000 R 000103 SOUTH   0000 R 000111 UNT1    0000 R 000112 UNT2    0000 R 000101 UTM
0000 D 000016 XM      0000 D 000022 XXX     0000 D 000020 YM      0000 D 000024 YYY
```

```
 1*   C        SUBROUTINE CONVGS (CFLAG,S1,DP,MP,SP,S2,DL,ML,SL,IZONE,X,Y,JERR)
 2*   C
 3*   C        THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
 4*   C
 5*   C        1.  GEOGRAPHIC TO STATE COORDINATES
 6*   C
 7*   C
 8*   C        2.  STATE TO GEOGRAPHIC COORDINATES
 9*   C
10*   C
11*   C
12*   C        VARIABLES:
13*   C        ----------
14*   C
15*   C        IZZ      --  ZONE SUBSCRIPT USED WITH ARRAYS A( ) & ALPHA( )
16*   C
17*   C        KK       --  PROJECTION TYPE
18*   C
19*   C
20*   C
21*   C        CONVENTIONS:
22*   C
23*   C        + LATITUDE    NORTHERN HEMISPHERE
24*   C        - LATITUDE    SOUTHERN
25*   C
26*   C        + LONGITUDE   WESTERN
27*   C        - LONGITUDE   EASTERN
28*   C
29*   C        + UTM ZONE    NORTHERN HEMISPHERE
30*   C        - UTM ZONE    SOUTHERN
31*   C
32*   C
33*         INTEGER CFLAG,DP,DL
34*         REAL    LBT,MINUS
35*         DOUBLE PRECISION IL,FAC,PHI,LAM,PHIR,LAMR,LAMR,X,Y,XM,YM,XXX,YYY
36*         DOUBLE PRECISION CONVRT,SP,SL
37*         DOUBLE PRECISION A(150,14)                                        GCC   006
38*         DIMENSION ALPHA(13,150)
39*         DIMENSION ALF3(8,4),ALF4(5)
40*         COMMON /CONVT/A,BLK1/ALPHA
41*         DATA FT1,FT2,RR1,RR2/'FEET',' ','METE','RS'/                      GCC   007
42*         DATA EF,EM/'F','M'/                                               GCC   012
43*         DATA A,F3 /                                      /                GCC   013
44*       *'TRAN','SVER','SE M','ERCA','TOR ','PROJ','ECTI','ON',   0,        GCC   014
45*       *'BLIQ','UE M','ERCA','TOR ','PROJ','ECTI','ON',                    GCC   015
46*       * 'L','ICHI','CAN ','LAMB','ERT ','PROJ','ECTI','ON'/               GCC   016
47*         DATA ALF4 /'GRID',' CCO','RDIN','ATES',' ', /                     GCC   017
48*         DATA LBT,UTM,OBL /'LBT','UTM','OBL'/                              GCC   018
49*         DATA MINUS,SOUTH,EAST/'-','S','E'/                                GCC   019
50*   C                                                                       GCC   020
51*   C     CONVRT(DG,AMIN,SEC)
52*   C       =(DBLE(DG)*3600.0D0)+(DBLE(AMIN)*60.0D0)+DBLE(SEC)
53*   C
54*   C
55*   C
56*         JERR=0
57*   C
```

```
00141   58*   C      CALL FILA                                              GCC  021

00141   59*   C
00142   60*   C      CALL FLALFA                                            GCC  022
00142   61*   C
00142   62*   C      CHECK FOR VALID STATE ZONE NUMBER (IZONE)
00142   63*   C
00142   64*   C      LAST TWO DIGITS OF IZONE MUST BE 01. 26. 51. OR 76
00142   65*   C
00143   66*          K=(100*IZONE-307600)/25
00143   67*          J=((IZONE-3076)/25)*100
00144   68*   C
00144   69*          IF (K.NE.J)                             GOTO 8000
00145   70*   C
00145   71*          IZZ=(IZONE-3076)/25
00147   72*          IF ((IZZ.LT.1).OR.(IZZ.GT.150))          GOTO 8000     GCC  079
00150   73*          IF (ALPHA(2.IZZ).EQ.LBT) KK=1                          GCC  080
00152   74*          IF (ALPHA(2.IZZ).EQ.UTM) KK=2                          GCC  081
00154   75*          IF (ALPHA(2.IZZ).EQ.OBL) KK=3
00156   76*   C
00156   77*   C      TEST ZONE (IZZ) = MICHIGAN LAMBERT
00156   78*   C
00160   79*          IF ((IZZ.EQ.131).OR.(IZZ.EQ.132).OR.(IZZ.EQ.133)) KK = 4   GCC  082
00162   80*          IF (ALPHA(3.IZZ).EQ.EM)                  GOTO 50
00164   81*          UNT1=F*1                                               GCC  084
00165   82*          UNT2=FT2                                               GCC  085
00166   83*          GOTO 60
00167   84*   50     UNT1 = RR1                                             GCC  088
00170   85*          UNT2 = RR2
00171   86*   60     CONTINUE
00172   87*   C
00173   88*          ADG=DP
00174   89*          AMIN=MP                                                GCC  116
00175   90*          PHI=CONVRT(ADG.AMIN.SP)                                GCC  117
00176   91*          ADG=DL                                                 GCC  118
00177   92*          AMIN=ML                                                GCC  119
00177   93*          LAM=CONVRT(ADG.AMIN.SL)                                GCC  120
00177   94*   C                                                             GCC  121
00177   95*   C      TEST CFLAG FOR TYPE OF CONVERSION
00177   96*   C
00177   97*   C             CFLAG = 1   GEOGRAPHIC TO STATE
00200   98*   C             CFLAG = 2   STATE TO GEOGRAPHIC
00200   99*   C
00204  100*          IF (CFLAG.EQ.2)                          GOTO 160
00204  101*   C
00206  102*   C      CFLAG = 1 AT THIS POINT      *
00207  103*   C
00210  104*          IF (S1.EQ.MINUS)        PHI=PHI*(-1.0D0)
00210  105*          IF (S2.EQ.MINUS)        LAM=LAM*(-1.0D0)
00210  106*          GOTO (100,120,140,115),KK
00211  107*  100     CONTINUE
00211  108*   C
00211  109*          CALL FILLA                                             GCC  131
00211  110*   C
00211  111*  110     CALL LAMFRD (PHI.LAM.X.Y.IZONE)
       112*   C
```

```
00212  116*        IF (ALPHA(3,IZZ).NE.EM)              GOTO 220            GCC B133
00214  117*        X = X/3.28083335333333D0                                GCC C133
00215  118*        Y = Y/3.28083335333333D0
00216  119*        GOTO 220
00216  120*  C
00216  121*  C         MICHIGAN LAMBERT PROJECTION
00217  122*  C
00220  123*  115  IZONE=IZZ-130                                            GCC 137
00221  124*        PHIR = PHI                                              GCC 138
00221  125*        LAMR = LAM
00222  126*  C
00222  127*        CALL GTPLAM (PHIR,LAMR,IZONE,X,Y)                       GCC 139
00223  128*  C
00223  129*        GOTO 220
00224  130*  120  CONTINUE
00225  131*  C
00225  132*        CALL FILLAA                                             GCC 142
00226  133*  C
00226  134*  130  IL=A(IZZ,2)-LAM
00227  135*  C
00227  136*        CALL UTMFW (PHI,IL,Y,X,$8040)
00277  137*  C
00230  138*        FAC=3.28083333333333D0*(A(IZZ,3)/.9996D0)               GCC 146
00231  139*        X=FAC*X+A(IZZ,1)                                        GCC 147
00232  140*        YM=A(IZZ,4)*.9996D0                                     GCC 148
00233  141*        Y=FAC*(Y-YM)                                           GCC 149
00234  142*        GOTO 220
00234  143*  C
00235  144*  140  CALL OBMER (PHI,LAM,X,Y)
00236  145*  C
00236  146*        GOTO 220
00236  147*  C-----------------
00236  148*  C
00236  149*  C       CFLAG = 2 AT THIS POINT       *
00237  150*  C
00240  151*  160  CONTINUE
00241  152*        GOTO (170,190,210,213),KK
00242  153*  170  CONTINUE
00242  154*  C
00243  155*        CALL FILLA                                              GCC 158
00243  156*  C
00244  157*        XXX = X                                                GCC A159
00245  158*        YYY = Y                                                 GCC B159
00247  159*        IF (ALPHA(3,IZZ).NE.EM)              GOTO 180
00250  160*        X = X/3.28083335333333D0                                GCC D159
00250  161*        Y = Y/3.28083335333333D0                                GCC E159
00251  162*  C
00251  163*  180  CALL LAMINV (X,Y,PHI,LAM,IZONE)
00252  164*  C
00252  165*        IF (ALPHA(3,IZZ).NE.EM)              GOTO 220            GCC B160
00254  166*        X = XXX                                                 GCC C160
00255  167*        Y = YYY
00256  168*        GOTO 220
00257  169*  190  CONTINUE
00257  170*  C
00260  171*        CALL FILLB9                                             GCC 163
00260  172*  C
00261  173*        FAC=3.28083333333333D0*(A(IZZ,3)/0.9996D0)              GCC 156
```

```
      XM=(X-A(IZZ.1))/FAC                              GCC  1C7
      YM=(Y/FAC)+(A(IZZ.4)*.9996D0)                    GCC  168
C
C     CALL UTMIVS (YM,XM,PHI,IL,$8060)
C
      LAM=A(IZZ.2)-IL                                  GCC  170
      GOTO 220
210   XM=X                                             GCC  173
      YM=Y
C
      CALL OBMINV(XM,YM,PHI,LAM)                        GCC  174
C
      GOTO 220
C
C     MICHIGAN LAMBERT PROJECTION
C
213   IZONE=IZZ-130                                     GCC  177
C
      CALL PTGLAM (X,Y,IZONE,PHI,LAM)
C
220   CONTINUE
C
C
      IF (LAM.GT.6.48D5) LAM=LAM-1.296D6                GCC  179
C
C     CONVERT SECONDS TO DEG-MIN-SEC
C
      CALL STOD (PHI,DP,MP,SP)
      CALL STOD (LAM,DL,ML,SL)
C
      GOTO 9999
C-------------
C
C     SET ERROR CODES
C
C
C     INVALID STATE ZONE NUMBER
C
8000  JERR=19
      IF (CFLAG.EQ.1)       GOTO 9200
      IF (CFLAG.EQ.2)       GOTO 9300
C
C     LATITUDE >= 80 DEG. 30 MIN.
C
8040  JERR=20
      GOTO 9200
C
C     NORTHING > 8.942.900 M.
C
8060  JERR=21
      GOTO 9300
C
9200  X=C.0D0
      Y=0.0D0
      GOTO 9999
C
9300  DP=0
      MP=0
```

```
****** CONVGS ******

00321   232*        SP=0.0D0                    000532
00322   233*        DL=0                         000533
00323   234*        ML=0                         000535
00324   235*        SL=0.0D0                     000535
00325   236*        GOTO 9999                    000537
00325   237*    C                                000537
00326   238*    C                                000537
00326   239*  9999 RETURN                        000541
00327   240*       END                           000675
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** CONVGU ******

@FOR.S CVCOORD.CONVGU.TPF$.CONVGU
FOR S0E3-05/17/78-08:30:09 (0.)

SUBROUTINE CONVGU   ENTRY POINT 000471

STORAGE USED: CODE(1) 000572: DATA(0) 000142: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003    TMCOF
0004    TMFWD
0005    TMINV
0006    NERR2$
0007    NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000302 100L     0001   000074 11L     0001   000051 12L     0001   000056 13L     0001   000063 14L
0001   000067 20L      0001   000132 30L     0001   000150 35L     0001   000176 40L     0001   000037 5L
0001   000462 9999L    0000 D 000005 A       0000 D 000046 B       0000 R 000001 BLANK   0000   000132 INJP$
0000 I 000060 ISPHER   0000 R 000000 MINUS   0000 D 000002 SLAT    0000 D 000004 SLON    0000 D 000056 UTZ
```

```
00101    1*        SUBROUTINE CONVGU (CFLAG,FLAG1,IDLAT,IMLAT,SECLAT,FLAG2,IDLON,
00101    2*     *                     IMLON,SECLON,IZONE,EAST,NORTH,
00101    3*     *                     SK,THET,JERR)
00101    4*    C
00101    5*    C    THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
00101    6*    C
00101    7*    C    1.   GEOGRAPHIC TO UTM COORDINATES
00101    8*    C
00101    9*    C    2.   UTM TO GEOGRAPHIC COORDINATES
00101   10*    C
00101   11*    C    CONVENTIONS:
00101   12*    C
```

```
00101   13*   C
00101   14*   C              + LATITUDE    NORTHERN HEMISPHERE
00101   15*   C              - LATITUDE    SOUTHERN
00101   16*   C
00101   17*   C              + LONGITUDE   WESTERN
00101   18*   C              - LONGITUDE   EASTERN
00101   19*   C
00101   20*   C              + UTM ZONE    NORTHERN HEMISPHERE
00101   21*   C              - UTM ZONE    SOUTHERN
00101   22*   C
00103   23*   C
00103   24*         INTEGER CFLAG
00104   25*         REAL    MINUS,BLANK
00105   26*         DOUBLE PRECISION SLAT,SLON,NORTH,EAST,A(16),B(4),SECLAT,SECLON,  UTM  33
00105   27*        .UTZ,SK,THET
00106   28*         DATA    MINUS,BLANK/1H-,1H /
00106   29*   C                                                                       UTM  37
00106   30*   C                                                                       UTM  43
00106   31*   C      SPHEROID PARAMETERS:
00106   32*   C
00106   33*   C                      0=CLARKE 1866 (DEFAULT)
00106   34*   C                      1=CLARKE 1880                                    UTM  47
00106   35*   C                      2=BESSEL                                         UTM  48
00106   36*   C                      3=MODIFIED MERCURY 1968                          UTM  49
00106   37*   C                      4=INTERNATIONAL
00106   38*   C
00106   39*   C
00106   40*   C      A(5)    --    FALSE EASTING
00106   41*   C      A(6)    --    FALSE NORTHING
00106   42*   C      A(15)   --    SEMIMAJOR AXIS
00106   43*   C      A(16)   --    ECCENTRICITY**2
00106   44*   C
00106   45*   C      B(1)    --    SEMIMINOR AXIS                                     UTM  51
00106   46*   C
00106   47*   C
00111   48*   C
00111   49*         JERR=0
00112   50*   C                                                                       UTM  55
00112   51*         ISPHER=0                                                          UTM  56
00112   52*   C---------------                                                        UTM  57
00112   53*   C                                                                       UTM  58
00113   54*         A(5)=5.0D5                                                        UTM  59
00114   55*         A(6)=0.0D0                                                        UTM  60
00115   56*         IF(FLAG1.EQ.MINUS)A(6)=10.0D6
00117   57*         IF(IZONE.LT.0)A(6)=10.0D6
00121   58*         A(7)=0.0D0
00122   59*         A(8)=0.990600
00123   60*         IF(ISPHER.EQ.0) GO TO 5
00125   61*         GOTO (11,12,13,14),ISPHER
00125   62*   C                                                                       UTM  62
00126   63*       5 A(15)=6378206.4D0                                                 UTM  63
00127   64*         B(1)=6356583.8D0                                                  UTM  64
00130   65*         GO TO 20
00130   66*   C
00131   67*      11 A(15)=6378249.145D0                                               UTM  66
00132   68*         B(1)=6356514.8695D0                                               UTM  67
00133   69*         GO TO 20
00133   70*   C
```

```
* * * * * *   CURVOU  * * * * * *

00134    71*    12  A(15)=6377397.1550D                              UTM  58
00135    72*        B(1)=6356079.8.96.8400                            UTM  61
00136    73*        GO TO 20                                          UTM  70
00137    74*    C
00137    75*    13  A(15)=6378150.0D0                                 UTM  71
00140    76*        B(1)=6356768.337D0                                UTM  72
00141    77*        GO TO 20                                          UTM  73
00141    78*    C
00142    79*    14  A(15)=6378388.0D0                                 UTM  74
00143    80*        B(1)=6356911.946130D0                             UTM  75
00143    81*    C
00144    82*    20  A(16)= ((A(15)-B(1))/A(15))*((A(15)+B(1))/A(15))  UTM  76
00144    83*    C                                                     UTM  77
00144    84*    C   COMPUTE COEFFICIENTS FOR CONVERSION
00145    85*    C
00145    86*        CALL TMCOF (A)                                    UTM  79
00145    87*    C
00145    88*    C   TEST CFLAG FOR TYPE OF CONVERSION                 UTM  81
00145    89*    C
00145    90*    C       CFLAG = 1   GEOGRAPHIC TO UTM
00145    91*    C       CFLAG = 2   UTM TO GEOGRAPHIC
00145    92*    C
00146    93*        IF (CFLAG.EQ.2) GOTO 100                          UTM  84
00146    94*    C                                                     UTM  85
00146    95*    C   CFLAG = 1 AT THIS POINT        *
00146    96*    C
00146    97*    C   TEST FOR IZONE INPUT WITH GEOGRAPHIC COORDINATES
00146    98*    C                                                     UTM  88
00150    99*        IF (IZONE.EQ.0)            GOTO 35
00150   100*    C
00150   101*    C   COMPUTE CENTRAL MERIDIAN IN SECONDS  --  FORCED ZONE   UTM  91
00150   102*    C
00152   103*    22  IF (IABS(IZONE).GT.30)              GOTO 30
00154   104*        UTZ=30.0D0-IABS(IZONE)
00155   105*        A(9)=((UTZ-6.0D0)+3.0D0)*3600.0D0                 UTM  96
00156   106*        GO TO 40                                          UTM  98
00157   107*    30  UTZ=IABS(IZONE)-30.0D0
00160   108*        A(9)=((UTZ-6.0D0)-3.0D0)*(-3600.0D0)              UTM 100
00161   109*        GO TO 40                                          UTM 102
00161   110*    C                                                     UTM 103
00161   111*    C   COMPUTE IZONE
00161   112*    C       CENTRAL MERIDIAN IN SECONDS
00161   113*    C       WHERE IZONE IS NOT INPUT
00161   114*    C
00162   115*    35  IZONE=30-(IDLON/6)                                UTM 106
00163   116*        IF(FLAG1.EQ.MINUS)IZONE=IDLON/6+31
00165   117*        UTZ=30.0D0-IZONE                                  UTM 108
00166   118*        A(9)=((UTZ-6.0D0)+3.0D0)*3600.0D0                 UTM 109
00166   119*    C                                                     UTM 110
00166   120*    C   CONVERT LATITUDE                                  UTM 111
00166   121*    C       LONGITUDE TO SECONDS
00167   122*    C
00167   123*    40  SLAT=IDLAT*3600.0D0+IMLAT*60.0D0+SECLAT           UTM 113
00170   124*        IF(FLAG1.EQ.MINUS)SLAT=SLAT*(-1.0D0)
00172   125*        SLON=IDLON*3600.0D0+IMLON*60.0D0+SECLON           UTM 115
00173   126*        IF(FLAG2.EQ.MINUS)SLON=SLON*(-1.0D0)              UTM 117
00173   127*    C                                                     UTM 118
00173   128*    C   CONVERT GEOGRAPHIC TO UTM COORDINATES
```

```
00173   129*   C
00175   130*   50  CALL TMFWD (SLAT,SLON,NORTH,EAST,A,SK,THET,JERR)
00175   131*   C
00176   132*         IF (JERR.GT.0)                          GOTO 9999
00200   133*         IF(FLAG1.EQ.MINUS.AND.IZONE.GT.0)IZONE=IZONE*(-1)
00202   134*         GOTO 9999
00202   135*   C    -----------------
00202   136*   C
00202   137*   C         CFLAG = 2 AT THIS POINT       .
00202   138*   C
00202   139*   C         COMPUTE CENTRAL MERIDIAN IN SECONDS
00202   140*   C              WHERE IZONE IS INPUT
00202   141*   C
00203   142*  100  UTZ=30.0D0-IABS(IZONE)
00204   143*         A(9)=((UTZ-6.0D0)+3.0D0)*3600.0D0
00204   144*   C
00204   145*   C         CONVERT UTM TO GEOGRAPHIC COORDINATES
00204   146*   C
00205   147*         CALL TMINV (NORTH,EAST,SLAT,SLON,A,SK,THET,JERR)
00205   148*   C
00206   149*         IF (JERR.GT.0)                          GOTO 9999
00206   150*   C
00206   151*   C         CONVERT SLAT
00206   152*   C              SLON TO STANDARD DEG-MIN-SEC FORMAT
00206   153*   C
00210   154*         IF(IZONE.LT.0)FLAG1=MINUS
00212   155*         IF(SLAT.LT.0.0D0)FLAG1=MINUS
00214   156*         IF(SLAT.LT.0.0D0)SLAT=SLAT*(-1.0D0)
00216   157*         IDLAT=SLAT/3600.D0
00217   158*         IMLAT=(SLAT-(IDLAT*3600.D0))/60.0D0
00220   159*         SECLAT=SLAT-(IDLAT*3600.D0)-(IMLAT*60.D0)
00221   160*         IF(SLON.LT.0.D0)FLAG2=MINUS
00223   161*         IF(SLON.LT.0.0D0)SLON=SLON*(-1.0D0)
00225   162*         IDLON=SLON/3600.0D0
00226   163*         IMLON=(SLON-(IDLON*3600.0D0))/60.0D0
00227   164*         SECLON=SLON-(IDLON*3600.D0)-(IMLON*60.D0)
00227   165*   C
00227   166*   C
00230   167*  9999  RETURN
00231   168*         END
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** CONVMU ******

@FOR.S CVCOORD.CONVMU.TPF$.CONVMU
FOR S0E3-05/17/78-08:30:36 (1.)

SUBROUTINE CONVMU   ENTRY POINT 001367

STORAGE USED: CODE(1) 001563; DATA(0) 000436; BLANK COMMON(2) 000000

```
...... ........ ......                                                          DATE 051778        PAGE  1

EXTERNAL REFERENCES (BLOCK, NAME)

0003   XPDI
0004   NERR3$

STORAGE ASSIGNMENT   (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001  000222 110L     0001  000250 115L     0001  000276 120L     0001  000324 125L
0001  000041 141G     0001  000302 145L     0001  000313 155L     0001  000041 155L
0001  000074 172L     0001  000734 173L     0001  000735 174L     0001  000757 174L
0001  001005 177L     0001  001010 176L     0001  001006 193L     0001  001037 200L
0001  000404 226G     0001  000432 243G     0001  001105 260L     0001  001016 217G
0001  001206 363G     0001  001226 375G     0001  001317 700CL    0001  001923 717CL
0001  001335 7080L    0001  001340 720CL    0001  001343 7200L    0001  001347 8100L
0000 D 000303 ADDN    0000 D 000125 C1866A  0000 D 000201 C1866B  0000 I 000201 C1866B
0000 I 000350 IEAST   0000 I 000346 II      0000 I 000347 IU      0000 I 000414 ...5
0000 I 000337 IXY     0000 I 000342 IZ3     0000 I 000341 JJ      0000 I 000343 JZ
0000   000344 LL      0000 R 000345 ...     0000 D 000327 NORTH2  0000 D 000013 ...
0000 I 000000 QROW    0000 D 000331 XX      0000 R 000025 SQX     0000 R 000055 SQY

C     SUBROUTINE CONVMU (CFLAG,IZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
C
C     THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
C
C     1.  MILITARY TO UTM COORDINATES
C
C     2.  UTM TO MILITARY COORDINATES
C
C     CONVENTIONS:
C
C        + UTM ZONE    NORTHERN HEMISPHERE
C        - UTM ZONE    SOUTHERN
C
C        CLARKE 1866 SPHEROID
C
      INTEGER CFLAG,QROW,DIGIT(10)
      REAL    QL(10),SQX(3),SQY(20,2)
      DOUBLE PRECISION C1866A,C1866B,ADDN(10)
      DOUBLE PRECISION EAST,NORTH,XX,XY,Q,SQ,LL,XX,XY,YY
      DATA    C1866A 509643.000,5314.0,4.6/5,50425.100,576.933.200.
     *               5984313.100,620.678.200,520.318.100.570,793.200.
     *               308.041.000,287.591.300,263.903.800,221.514.600.
     *               172.934.500,132.476.500,1105.47.700,81.434.700.
     *               66.315.300,53.172.034.500,1547.037,180.132.476.500.
      DATA    C1866B  4971070.100,5C.43.43.70.0/
     *               16.992,396,000,
     *               82131056.600,798.773.100.665.1216.300,642.511.700/
      DATA    QL/1HN,1H0,1H0,1H+,1H/,1H-,1H,1H+,1H+,1HX/
      DATA    QN/0.0D0,834245.750,178.6834.3C0.243.403.750.35.42760.200.
     *               4427560.500,5516064.800,6205.078.200,76.6626.700.
```

```
      DATA   SQX/1HS,1HT,1HU,1HV,1HX,1HX,1HY,1HZ,
     *            1HA,1HB,1HC,1HE,1HE,1HF,1HG,1HH,
     *            1HJ,1HK,1HL,1HM,1HN,1HP,1HQ,1HR/
      DATA   SQY/1HL,1HM,1HN,1HP,1HQ,1HR,1HS,1HT,1HU,1HV,1HA,1HB,1HC,
     *            1HD,1HE,1HF,1HG,1HH,1HJ,1HK,
     *            1HR,1HS,1HT,1HU,1HV,1HA,1HB,1HC,1HD,1HE,1HF,1HG,1HH,
     *            1HJ,1HK,1HL,1HM,1HN,1HP,1HQ/
      DATA   ADDN/3*0.D0,2.D6,0.D0,0.4.D6,0.D0,6.D6,6.D6,0.D0/
C
C
      JERR=0
C
C     CHECK PROPER UTM ZONE NUMBER FOR CLARKE 1866 SPHEROID
C
      IF (IZONE.LE.0.OR.IZONE.GT.22)
     *            GOTO 7000
C
C     TEST CFLAG FOR TYPE OF CONVERSION
C     CFLAG = 1  MILITARY TO UTM
C     CFLAG = 2  UTM TO MILITARY
C
      IF (CFLAG.EQ.2)            GOTO 200
C
C     CFLAG = 1 AT THIS POINT      !*
C
      S=6H
      T=6H
      FLD(0.6.S)=FLD(0.6.SQ)
      FLD(0.6.T)=FLD(0.6.SQ)
C
C     SEPARATE 10 DIGITS OF MIL. GRID COORDINATES
C                       AND STORE IN DIGIT( )
C
      IXY=IDINT(XYMIL)
      KK=10
      DO 100 JJ=1,10
      DIGIT(KK)=IXY-10*(IXY/10)
      IXY=IXY/10
      KK=KK-1
100   CONTINUE
      IF (DIGIT(1).EQ.0.AND.DIGIT(2).EQ.0.AND.DIGIT(3).EQ.0.AND.
     *    DIGIT(4).EQ.0.AND.DIGIT(5).EQ.0.AND.DIGIT(6).EQ.0.AND.
     *    DIGIT(7).EQ.0.AND.DIGIT(8).EQ.0)
     *            GOTO 110
      IF (DIGIT(1).EQ.0.AND.DIGIT(2).EQ.0.AND.DIGIT(3).EQ.0.AND.
     *    DIGIT(4).EQ.0.AND.DIGIT(5).EQ.0.AND.DIGIT(6).EQ.0)
     *            GOTO 115
      IF (DIGIT(1).EQ.0.AND.DIGIT(2).EQ.0.AND.DIGIT(3).EQ.0.AND.
     *    DIGIT(4).EQ.0)
     *            GOTO 120
      IF (DIGIT(1).EQ.0.AND.DIGIT(2).EQ.0)
     *            GOTO 125
C
C     10-DIGIT COORDINATES
C
      EAST=IDINT(XYMIL/1.D5)
```

```
        NORTH=XYMIL-EAST*1.D5
        GOTO 130
C
C       2-DIGIT COORDINATES
C
110     EAST=IDINT(XYMIL/1.D1)
        NORTH=XYMIL-EAST*1.D1
        EAST=EAST*1.D4
        NORTH=NORTH*1.D4
        GOTO 130
C
C       4-DIGIT COORDINATES
C
115     EAST=IDINT(XYMIL/1.D2)
        NORTH=XYMIL-EAST*1.D2
        EAST=EAST*1.D3
        NORTH=NORTH*1.D3
        GOTO 130
C
C       6-DIGIT COORDINATES
C
120     EAST=IDINT(XYMIL/1.D3)
        NORTH=XYMIL-EAST*1.D3
        EAST=EAST*1.D2
        NORTH=NORTH*1.D2
        GOTO 130
C
C       8-DIGIT COORDINATES
C
125     EAST=IDINT(XYMIL/1.D4)
        NORTH=XYMIL-EAST*1.D4
        EAST=EAST*1.D1
        NORTH=NORTH*1.D1
130     IZ3=1+MOD(IZONE,3)
        JZ=MOD(IZONE,2)                        JZ=2
        IF (JZ.EQ.0)                    GOTO 145
        IF (JZ.EQ.2)
C
C       UTM ZONE NUMBER IS ODD
C
        DO 140 LL=1,20
        IF (T.EQ.SQY(LL,1))             GOTO 155
140     CONTINUE
C
        GOTO 7040
145     CONTINUE
C
C       UTM ZONE NUMBER IS EVEN
C
        DO 150 LL=1,20
        IF (T.EQ.SQY(LL,2))             GOTO 155
150     CONTINUE
C
        GOTO 7040
C
C       ADD MULTIPLE OF 100.000 METERS TO NORTHING
C
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00235   150*   155 NORTH=NORTH+DFLOAT(LL-1)*1.D5
00236   151*       IF (Q.EQ.1HX)          GOTO 170
00240   152*       DO 160 QROW=1,9
00243   153*       IF (Q.EQ.QL(QROW))      GOTO 163
00245   154*   160 CONTINUE
00245   155*   C
00247   156*       GOTO 7060
00250   157*   163 IF (QROW.EQ.3.OR.QROW.EQ.5.OR.QROW.EQ.7)
00250   158*                               GOTO 172
00250   159*       *
00250   160*   C   ADD MULTIPLE OF 2 MILLION METERS TO NORTHING
00252   161*   C
00253   162*       NORTH=NORTH+ADDN(QROW)
00253   163*       GOTO 178
00253   164*   C
00253   165*   C   6 X 8 QUADRANGLE WITH LETTER X
00254   166*   C
00254   167*   170 IF (JZ.EQ.1.AND.T.GT.1HK.AND.T.LT.1HW)
00254   168*                               NORTH=NORTH+8.D6
00256   169*       *
00256   170*       IF (JZ.EQ.1.AND.T.EQ.1HK)
00260   171*                               NORTH=NORTH+6.D6
00260   172*       *
00260   173*       IF (JZ.EQ.1.AND.T.GE.1HA.AND.T.LT.1HE)
00262   174*                               NORTH=NORTH+8.D6
00262   175*       *
00262   176*       IF (JZ.EQ.2.AND.((T.GT.1HQ.AND.T.LT.1HW)
00264   177*          .OR.(T.GE.1HA.AND.T.LT.1HF)))
00264   178*                               NORTH=NORTH+8.D6
00266   179*       *
00266   180*       IF (JZ.EQ.2.AND.T.EQ.1HQ)
00270   181*                               NORTH=NORTH+6.D6
00271   182*       *
00273   183*       IF (JZ.EQ.2.AND.T.GE.1HF.AND.T.LT.1HK)
00273   184*                               NORTH=NORTH+8.D6
00273   185*       *
00275   186*       GOTO 178
00275   187*   172 IF (QROW.EQ.5)          GOTO 174
00277   188*       IF (QROW.EQ.7)          GOTO 176
00300   189*   C
00302   190*   C   6 X 8 QUADRANGLE WITH LETTER Q
00302   191*   C
00302   192*       IF (LL.GE.18.AND.LL.LE.20)
00303   193*                               GOTO 173
00303   194*       *
00303   195*       NORTH=NORTH+2.D6
00305   196*       GOTO 178
00307   197*   173 NORTH=NORTH+0.D6
00310   198*       GOTO 178
00310   199*   C
00310   200*   C   6 X 8 QUADRANGLE WITH LETTER S
00310   201*   C
00311   202*   174 IF (LL.GE.16.AND.LL.LE.20)
00311   203*                               GOTO 175
00313   204*       *
00314   205*       NORTH=NORTH+4.D6
        206*       GOTO 178
        207*   175 NORTH=NORTH+2.D6
               GOTO 178
           C
           C   6 X 8 QUADRANGLE WITH LETTER U
           C
       176 IF (LL.GE.14.AND.LL.LE.20)
                                   GOTO 177
           *
           NORTH=NORTH+6.D6
           GOTO 178
```

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177 NORTH=NORTH+4.D6
178 DO 180 MM=1,8
    IF (S.EQ.SQX(MM,IZ3)) GOTO 183
180 CONTINUE
C
C       GOTO 7080
C
C       ADD MULTIPLE OF 100.000 METERS TO EASTING
C
183 EAST=EAST+DFLOAT(MM)*1.D5
    GOTO 9909
C-------------
C
C       CFLAG = 2 AT THIS POINT        *
C
200 CONTINUE
C
C       CHECK NORTHING LIMITS FOR CLARKE 1866 SPHEROID
C
    IF (NORTH.LT.C1866A(IZONE).OR.NORTH.GT.C1866B(IZONE))
   *                              GOTO 7200
    DO 250 JJ=1,10
    IF (NORTH.GE.QN(JJ).AND.NORTH.LT.QN(JJ+1))
   *                              GOTO 280
250 CONTINUE
C
    GOTO 7200
C
C       COMPUTE ROW LETTER OF 6 X 8 QUADRANGLE
C
280 Q=QL(JJ)
C
    II=IDINT(EAST/1.D5)
    IZ3=1+MOD(IZONE,3)
C
C       COMPUTE X DESIGNATOR OF 100.000 M SQUARE
C
    S=SQX(II,IZ3)
C
    NORTH2=DMOD(NORTH,2.D6)
    IJ=IDINT(NORTH2/1.D5)+1
    JZ=MOD(IZONE,2)                     JZ=2
    IF (JZ EQ.0)
C
C       COMPUTE Y DESIGNATOR OF 100.000 M SQUARE
C
    T=SQY(IJ,JZ)
C
    SQ=6H
    FLD(0.6.SO)=FLD(0.6.S)
    FLD(6.6.SQ)=FLD(0.6.T)
C
    IEAST=IDINT((10.D0*EAST+5.D0)/10.D0)
    XX=0.D0
    DO 300 KK=1.5
    IDIGIT=IEAST-10*(IEAST/10)
    XX=XX+DFLOAT(IDIGIT)*10.D0**(KK-1)
```

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******    CONV4D    ******

00367    266*         IEAST=IEAST/10
00370    267*    300  CONTINUE
00372    268*         INORTH=IDINT((10.D0*NORTH+5.D0)/10.D0)
00373    269*         YY=0.D0
00374    270*         DO 320 KK=1,5
00377    271*         IDIGIT=INORTH-10*(INORTH/10)
00400    272*         YY=YY+DFLOAT(IDIGIT)*10.D0**(KK-1)
00401    273*         INORTH=INORTH/10
00402    274*    320  CONTINUE
00402    275*   C
00402    276*   C     CONCATENATE RIGHTMOST 5 DIGITS OF EASTING AND NORTHING
00404    277*   C
00404    278*         XYMIL=XX*1.D5+YY
00405    279*         GOTO 9999
00405    280*   C--------------------------------
00405    281*   C
00405    282*   C     SET ERROR CODES
00405    283*   C
00405    284*   C
00405    285*   C     UTM ZONE NUMBER > 22 WITH CLARKE 1866 SPHEROID
00405    286*   C
00406    287*   7000  JERR=10
00407    288*         IF (CFLAG.EQ.1)                    GOTO 9200
00411    289*         IF (CFLAG.EQ.2)                    GOTO 9300
00411    290*   C
00411    291*   C     INVALID Y DESIGNATOR OF 100,000 M. SQUARE
00411    292*   C
00413    293*   7040  JERR=13
00414    294*         GOTO 9200
00414    295*   C
00414    296*   C     INVALID ROW LETTER OF 6 X 8 QUADRANGLE
00414    297*   C
00415    298*   7060  JERR=11
00416    299*         GOTO 9200
00416    300*   C
00416    301*   C     INVALID X DESIGNATOR OF 100,000 M. SQUARE
00416    302*   C
00417    303*   7080  JERR=12
00420    304*         GOTO 9200
00420    305*   C
00420    306*   C     INVALID NORTHING WITH CLARKE 1866 SPHEROID
00420    307*   C
00421    308*   7200  JERR=14
00422    309*         GOTO 9300
00422    310*   C
00423    311*   9200  EAST=0.0D0
00424    312*         NORTH=0.0D0
00425    313*         GOTO 9399
00426    314*   9300  XYMIL=0.0D0
00427    315*         GOTO 9999
00427    316*   C
00427    317*   9999  RETURN
00430    318*         END
00431    319*
```

END OF COMPILATION: NO   DIAGNOSTICS.

©HDG.P ****** COORGM ******

@FOR,S CVCOORD.COORGM,TPF$.COORGM
FOR S0E3-05/17/78-08:31:07 (2.)

SUBROUTINE COORGM   ENTRY POINT 000223

STORAGE USED: CODE(1) 000255; DATA(0) 000062; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003    ZONE2
0004    CONVGU
0005    CONVMU
0006    NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000172 8000L   0001   000175 9050L   0001   000200 9500L   0001   000214 9999L   0000 R 000027 ASTE
0000 R 000030 BLANK   0000 I 000001 DL      0000 I 000000 DP      0000 D 000023 EAST    0000 R 000031 H1
0000 R 000032 H2      0000   000052 INJP$   0000 R 000006 LETTE   0000 R 000003 LETTN   0000 R 000004 LETTS
0000 R 000005 LETTW   0000 R 000010 MINUS   0000 I 000036 ML      0000 I 000035 MP      0000 D 000025 NORTH
0000 R 000007 PLUS    0000 R 000011 Q       0000 D 000013 SK      0000 D 000021 SL      0000 D 000017 SP
0000 R 000012 SQ      0000 I 000002 SZONE   0000 R 000033 S1      0000 R 000034 S2      0000 D 000015 THET
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            SUBROUTINE COORGM (INST,PHI,LAM,UZONE,QSQ,XYMIL,JERR)

  1*    C
  2*    C   SUBROUTINE COORGM
  3*    C   H.O. EBERHART  -  DECEMBER 1977
  4*    C   TEL (301) 671 3125
  5*    C
  6*    C   POTOMAC RESEARCH, INC.
  7*    C
  8*    C
  9*    C   THIS SUBROUTINE CONVERTS
 10*    C          GEOGRAPHIC TO MILITARY COORDINATES
 11*    C
 12*    C
 13*    C
 14*    C   CALLING SEQUENCE:
 15*    C   *
 16*    C   CALL COORGM (INST,PHI,LAM,UZONE,QSQ,XYMIL,JERR)
 17*    C      INST  -- I   HOLLERITH  INSTALLATION
 18*    C      PHI   -- I   D.P.       LATITUDE
 19*    C      LAM   -- I   D.P.       LONGITUDE
 20*    C      UZONE -- O   INTEGER    + OR - UTM ZONE NUMBER
 21*    C      QSQ   -- O   HOLLERITH  QUADRANGLE ROW &
 22*    C                              100,000 M. SQUARE
 23*    C      XYMIL -- O   D.P.       COORDINATE STRING MIL.
 24*    C      JERR  -- O   INTEGER    ERROR CODE
 25*    C
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00101   26*  C      *
00101   27*  C
00101   28*  C    CONVENTIONS:
00101   29*  C
00101   30*  C         +  LATITUDE    NORTHERN HEMISPHERE
00101   31*  C         -  LATITUDE    SOUTHERN
00101   32*  C
00101   33*  C         +  LONGITUDE   WESTERN
00101   34*  C         -  LONGITUDE   EASTERN
00101   35*  C
00101   36*  C
00101   37*  C         +  UTM ZONE    NORTHERN HEMISPHERE
00101   38*  C         -  UTM ZONE    SOUTHERN
00101   39*  C
00101   40*  C            CLARKE 1866 SPHEROID
00101   41*  C
00101   42*  C
00103   43*         INTEGER DP,DL,SZONE,UZONE
00104   44*         REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
00105   45*         DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM,XYMIL
00106   46*         DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
00113   47*         DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
00113   48*  C
00113   49*  C
00113   50*         JERR=0
00120   51*  C                                -
00120   52*  C
00120   53*  C    GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
00120   54*  C
00121   55*     50  CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
00121   56*  C
00122   57*         IF (H1.EQ.LETTN)        S1=PLUS
00124   58*         IF (H1.EQ.LETTS)        S1=MINUS
00126   59*         IF (H2.EQ.LETTW)        S2=PLUS
00130   60*         IF (H2.EQ.LETTE)        S2=MINUS
00130   61*  C
00132   62*     60  DP=IDINT(PHI/1.D4)
00132   63*         MP=IDINT(PHI/1.D2)-100*DP
00134   64*         SP=PHI-DFLOAT(DP*10000)-DFLOAT(MP*100)
00135   65*         DL=IDINT(LAM/1.D4)
00136   66*         ML=IDINT(LAM/1.D2)-100*DL
00137   67*         SL=LAM-DFLOAT(DL*10000)-DFLOAT(ML*100)
00137   68*  C
00140   69*         CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
00140   70*        *             JERR)
00141   71*  *      IF (JERR.GT.0)         GOTO 9999
00143   72*         CALL CONVMU (2,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
00144   73*         GOTO 9500
00144   74*  C-------------------
00144   75*  C
00144   76*  C       INVALID INSTALLATION  --   2 ALPHABETIC
00144   77*  C
00145   78*   8000  JERR=1
00146   79*         GOTO 9050
00146   80*  C
00147   81*   9050  XYMIL=0.0D0
00150   82*         GOTO 9999
00150   83*  C
```

```
00151  84*   9500  QSQ=6H                         000200
00152  85*         FLD(0.6.QSQ) =FLD(0,6,Q)        000201
00153  86*         FLD(G,12,QSQ)=FLD(0,12,SQ)      000203
00154  87*         GOTO 9999                       000212
00154  88*     C                                   000212
00154  89*     C
00155  90*  9999  RETURN                           000212
00156  91*        END                              000214
                                                   000254
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** COORGS ******

@FOR.S CVCOORD.COORGS.TPF$.COORGS
FOR S0E3-05/17/78-08:31:29 (2.)

SUBROUTINE COORGS   ENTRY POINT 000171

STORAGE USED: CODE(1) 000216; DATA(0) 000046; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003  ZONE2
0004  CONVGS
0005  NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000153 8000L   0001   000156 9100L   0001   000162 9999L   0000 R 000015 ASTER   0000 R 000016 BLANK
0000 I 000001 DL      0000 I 000000 DP      0000 R 000017 H1      0000 R 000020 H2      0000 R 000036 INJPS
0000 R 000006 LETTE   0000 R 000003 LETTN   0000 R 000004 LETTS   0000 R 000005 LETTW   0000 R 000010 MINUS
0000 I 000024 ML      0000 I 000023 MP      0000 R 000007 PLUS    0000 R 000013 SL      0000 R 000011 SP
0000 R 000021 S1      0000 R 000022 S2      0000 I 000002 UZONE                          0000 D 000011 SL
```

```
00101  1*    SUBROUTINE COORGS (INST,PHI,LAM,SZONE,XSTP,YSTP,JERR)   000000
00101  2*  C                                                          000000
00101  3*  C     SUBROUTINE COORGS                                    000000
00101  4*  C                                                          000000
00101  5*  C     H.O. EBERHART  -   DECEMBER 1977                     000000
00101  6*  C                                                          000000
00101  7*  C     TEL (301) 671 3125                                   000000
00101  8*  C                                                          000000
00101  9*  C     POTOMAC RESEARCH, INC.                               000000
00101 10*  C                                                          000000
00101 11*  C     THIS SUBROUTINE CONVERTS                             000000
00101 12*  C               GEOGRAPHIC TO STATE COORDINATES            000000
00101 13*  C             -                                            000000
00101 14*  C             -                                            000000
```

```
                CALLING SEQUENCE:
00101    15*  C
00101    16*  C      *
00101    17*  C      CALL CCRGS (INST,PHI,LAM,SZONE,XSTP,YSTP,JERR)
00101    18*  C           INST   -- I  HOLLERITH  INSTALLATION
00101    19*  C           PHI    -- I  D.P.       LATITUDE
00101    20*  C           LAM    -- I  D.P.       LONGITUDE
00101    21*  C           SZONE  -- O  INTEGER    STATE ZONE NUMBER
00101    22*  C           XSTP   -- O  D.P.       X COORDINATE STATE
00101    23*  C           YSTP   -- O  D.P.       Y COORDINATE STATE
00101    24*  C           JERR   -- O  INTEGER    ERROR CODE
00101    25*  C
00101    26*  C      *
00101    27*  C
00101    28*  C      CONVENTIONS:
00101    29*  C
00101    30*  C           + LATITUDE    NORTHERN HEMISPHERE
00101    31*  C           - LATITUDE    SOUTHERN
00101    32*  C
00101    33*  C           + LONGITUDE   WESTERN
00101    34*  C           - LONGITUDE   EASTERN
00101    35*  C
00101    36*  C           + UTM ZONE    NORTHERN HEMISPHERE
00101    37*  C           - UTM ZONE    SOUTHERN
00101    38*  C
00101    39*  C           CLARKE 1866 SPHEROID
00101    40*  C                        1
00101    41*  C
00103    42*        INTEGER DP,DL,SZONE,UZONE
00104    43*        REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS
00105    44*        DOUBLE PRECISION SP,SL,XSTP,YSTP,PHI,LAM
00106    45*        DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
00113    46*        DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
00113    47*  C
00113    48*  C
00120    49*  C
00120    50*        JERR=0
00120    51*  C      GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
00121    52*  C
00121    53*     50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
00121    54*  C
00121    55*        IF (H1.EQ.LETTN)     S1=PLUS
00122    56*        IF (H1.EQ.LETTS)     S1=MINUS
00124    57*        IF (H2.EQ.LETTW)     S2=PLUS
00126    58*        IF (H2.EQ.LETTE)     S2=MINUS
00130    59*  C
00130    60*     60 DP=IDINT(PHI/1.D4)
00132    61*        MP=IDINT(PHI/1.D2)-100*DP
00133    62*        SP=PHI-DFLOAT(DP*10000)-DFLOAT(MP*100)
00134    63*        DL=IDINT(LAM/1.D4)
00135    64*        ML=IDINT(LAM/1.D2)-100*DL
00136    65*        SL=LAM-DFLOAT(DL*10000)-DFLOAT(ML*100)
00137    66*  C
00137    67*        CALL CONVGS (1,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
00140    68*        GOTO 9999
00141    69*  C----------
00141    70*  C
00141    71*  C      INVALID INSTALLATION  --  2 ALPHABETIC
00141    72*  C
```

```
****** COORGS ******

00141   73*   C
00142   74*         3000 JEKH=1
00143   75*              GOTO 9100
00144   76*   C
00145   77*         9100 XSTP=0.0D0
00146   78*              YSTP=0.0D0
00147   79*              GOTO 9999
00148   80*   C
00146   81*   C
00147   82*         9999 RETURN
00150   83*              END
```

```
                                                           000151
                                                           000153
                                                           000154
                                                           000154
                                                           000156
                                                           000157
                                                           000160
                                                           000160
                                                           000160
                                                           000162
                                                           000215
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** ,COORGU ******

@FOR.S CVCOORD.COORGU.TPF$.COORGU
FOR SOE3-05/17/78-09:31:45 (2.)

SUBROUTINE COORGU   ENTRY POINT 000173

STORAGE USED: CODE(1) 000220: DATA(0) 000052: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

0003   ZONE2
0004   CONVGU
0005   NERR3$

STORAGE ASSIGNMENT   (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001 000155 8000L	0001 000150 9150L	0001 000160 9999L	0000 R 000021 ASTER	0000 R 000022 BLANK
0000 I 000001 DL	0000 I 000000 DP	0000 R 000023 H1	0000 R 000024 H2	0000 R 000042 INJP5
0000 R 000006 LFTTE	0000 R 000003 LETTH	0000 R 000004 LETTS	0000 R 000005 LETTW	0000 R 000010 MINUS
0000 I 000030 ML	0000 I 000027 MP	0000 R 000007 PLUS	0000 D 000011 SA	0000 D 000017 SL
0000 D 000015 SP	0000 I 000002 SZONE	0000 R 000025 S1	0000 R 000026 S2	0000 D 000013 THET

```
00101    1*         SUBROUTINE COORGU (INST,PHI,LAM,UZONE,EAST,NORTH,JERR)
00101    2*   C
00101    3*   C     SUBROUTINE COORGU
00101    4*   C     H.O. EBERHART  -  DECEMBER 1977
00101    5*   C     TEL (301) 671 3125
00101    6*   C
00101    7*   C     POTOMAC RESEARCH, INC.
00101    8*   C
00101    9*   C
00101   10*   C     THIS SUBROUTINE CONVERTS
00101   11*   C                   GEOGRAPHIC TO UTM COORDINATES
```

```
      C
      C
      C
      C   CALLING SEQUENCE:
      C       *
      C       CALL COORGU (INST,PHI,LAM,UZONE,EAST,NORTH,JERR)
      C         INST    --  I   HOLLERITH  INSTALLATION
      C         PHI     --  I   D.P.       LATITUDE
      C         LAM     --  I   D.P.       LONGITUDE
      C         UZONE   --  O   INTEGER    + OR - UTM ZONE NUMBER
      C         EAST    --  O   D.P.       EASTING
      C         NORTH   --  O   D.P.       NORTHING
      C         JERR    --  O   INTEGER    ERROR CODE
      C       *
      C
      C   CONVENTIONS:
      C
      C         + LATITUDE      NORTHERN HEMISPHERE
      C         - LATITUDE      SOUTHERN
      C
      C         + LONGITUDE     WESTERN
      C         - LONGITUDE     EASTERN
      C
      C         + UTM ZONE      NORTHERN HEMISPHERE
      C         - UTM ZONE      SOUTHERN
      C
      C         CLARKE 1866 SPHEROID
      C
      C
        INTEGER DP,DL,SZONE,UZONE
        REAL    LETTN,LETTS,LETTN,LETTE,PLUS,MINUS
        DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM
        DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
        DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
      C
      C
        JERR=0
      C
      C   GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
      C
     50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
      C
        IF (H1.EQ.LETTN)     S1=PLUS
        IF (H1.EQ.LETTS)     S1=MINUS
        IF (H2.EQ.LETTW)     S2=PLUS
        IF (H2.EQ.LETTE)     S2=MINUS
      C
     60 DP=IDINT(PHI/1.D4)
        MP=IDINT(PHI/1.D2)-100*DP
        SP=PHI-DFLOAT(DP*10000)-DFLOAT(MP*100)
        DL=IDINT(LAM/1.D4)
        ML=IDINT(LAM/1.D2)-100*DL
        SL=LAM-DFLOAT(DL*10000)-DFLOAT(ML*100)
      C
        CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
       * JERR)
```

```
00141  70*         GOTO 9999                                    CC0153
00141  71*   C----------                                        CC0153
00141  72*   C                                                  CC0153
00141  73*   C        INVALID INSTALLATION  --  2 ALPHABETIC     CC0153
00141  74*   C                                                  CC0153
00142  75*   8000 JERR=1                                        CC0155
00143  76*        GOTO 9150                                     CC0155
00143  77*   C                                                  CC0157
00144  78*   9150 EAST =0.0D0                                   CC0160
00145  79*        NORTH=0.0D0                                   CC0161
00146  80*        GOTO 9999                                     CC0162
00146  81*   C                                                  CC0162
00147  82*   C                                                  CC0163
00147  83*   9999 RETURN                                        CC0163
00150  84*        END                                           CC0217
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** COORMG ******

@FOR.S CVCOORD.COORMG.TPFS.COORMG
FOR S0E3-05/17/78-08:32:01 (1.)

SUBROUTINE COORMG   ENTRY POINT 000205

STORAGE USED: CODE(1) 000244: DATA(0) 000052: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003   ZONE2
0004   CONMU
0005   CONGU
0006   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000116 8000L    0001   000121 8040L    0001   000124 8060L    0001   000127 9C00L    0001   000123 9540L
0001   000176 9999L    0000 R 000030 ASTER    0000 R 000031 BLANK    0000 I 000001 DL       0000 I 000000 LP
0000 D 000024 EAST     0000   000045 INJPS    0000   000007 LETTE    0000 R 000004 LETTN    0000 R 000005 LETTS
0000 R 000006 LETTW    0000 R 000011 MINUS    0000 I 000035 ML       0000 I 000034 MP       0000 D 000026 NORTH
0000 R 000013 PLUS     0000 R 000012 Q        0000 D 000014 SK       0000 D 000022 SL       0000 D 000020 SP
0000 R 000003 SQ       0000 I 000002 SZONE    0000 R 000032 S1       0000 R 000033 S2       0000 R 000016 THET
0000 I 000003 UZONE
```

SUBROUTINE COORMG (INST,QSQ,XYMIL,H1,PHI,H2,LAM,JERR)

```
00101  1*  C                                                  000000
00101  2*  C   SUBROUTINE COORMG                              000000
00101  3*  C   H.O. EBERHART  -   DECEMBER 1977                000000
00101  4*  C
```

```
C   ******   TEL (301) 671 3125
C
C            POTOMAC RESEARCH, INC.
C
C            THIS SUBROUTINE CONVERTS
C
C                         MILITARY TO GEOGRAPHIC COORDINATES
C
C
C            CALLING SEQUENCE:
C            *
C            CALL COORMG (INST,QSQ,XYMIL,H1,PHI,H2,LAM,JERR)
C                 INST   -- I  HOLLERITH  INSTALLATION
C                 QSQ    -- I  HOLLERITH  QUADRANGLE ROW &
C                                         100,000 M. SQUARE
C                 XYMIL  -- I  D.P.       COORDINATE STRING MIL.
C                 H1     -- O  HOLLERITH  HEMISPHERE (N,S)
C                 PHI    -- O  D.P.       LATITUDE
C                 H2     -- O  HOLLERITH  HEMISPHERE (W,E)
C                 LAM    -- O  D.P.       LONGITUDE
C                 JERR   -- O  INTEGER    ERROR CODE
C
C            *
C
C            CONVENTIONS:
C                                     +
C                 + LATITUDE    NORTHERN HEMISPHERE
C                 - LATITUDE    SOUTHERN
C
C                 + LONGITUDE   WESTERN
C                 - LONGITUDE   EASTERN
C
C                 + UTM ZONE    NORTHERN HEMISPHERE
C                 - UTM ZONE .  SOUTHERN
C
C                 CLARKE 1866 SPHEROID
C
C
      INTEGER DP,DL,SZONE,UZONE
      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
      DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM,XYMIL
      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
C
      JERR=0
C
C   GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
C
   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$9000)
C
      IF (H1.EQ.LETTN)    S1=PLUS
      IF (H1.EQ.LETTS)    S1=MINUS
      IF (H2.EQ.LETTW)    S2=PLUS
      IF (H2.EQ.LETTE)    S2=MINUS
C
```

```
00132   63*   70 Q =6H
00133   64*      SQ=6H
00134   65*      FLD(0,6,Q) =FLD(0,6,QSQ)
00135   66*      FLD(0,12,SQ)=FLD(6,12,QSQ)
00135   67*   C
00136   68*      IF (XYMIL.EQ.0.0D0)     GOTO 8040
00140   69*      IF (QSQ.EQ.BLANK)       GOTO 8060
00142   70*      CALL CONVGU (1,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
00143   71*      IF (JERR.GT.0)          GOTO 9999
00145   72*      CALL CONVGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
00145   73*     *             JERR)
00146   74*      GOTO 9540
00146   75*   C-------
00146   76*   C
00146   77*   C            INVALID INSTALLATION  --   2 ALPHABETIC
00147   78*   C
00150   79*   8000 JERR=1
00150   80*      GOTO 9000
00150   81*   C
00150   82*   C            MISSING INPUT COORDINATES
00151   83*   C
00152   84*   8040 JERR=2
00152   85*      GOTO 9000
00152   86*   C
00152   87*   C      MISSING 3 LETTERS  --   QUADRANGLE & 100.000 M. SQUARE
00153   88*   C
00154   89*   8060 JERR=3
00154   90*      GOTO 9000
00155   91*   C
00156   92*   9000 PHI=0.0D0
00157   93*      LAM=0.0D0
00157   94*      GOTO 9999
00160   95*   C
00161   96*   9540 PHI=DFLOAT(DP*10000)+DFLOAT(MP*100)+SP
00162   97*      LAM=DFLOAT(DL*10000)+DFLOAT(ML*100)+SL
00162   98*      GOTO 9999
00163   99*   C
00164  100*   C
       101*   9999 RETURN
       102*      END
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** COORMS ******

@FOR.S CVCOORD.COORMS,TPF$.COORMS
FOR S0E3-05/17/78-08:32:18 (2.)

SUBROUTINE COORMS   ENTRY POINT 000164

STORAGE USED: CODE(1) 000220: DATA(0) 000051; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

```
0003   ZONE2
0004   CONVMU
0005   CONVGU
0006   CONVGS
0007   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000140 8000L    0001   000143 8040L    0001   000146 8060L    0001   000151 9100L    0001   000155 9999L
0000 R 000027 ASTER    0000 R 000030 BLANK    0000 I 000001 DL       0000 I 000000 DP       0000 D 000023 EAST
0000 R 000031 H1       0000 R 000032 H2       0000   000044 INUP$    0000 R 000006 LETTE    0000 R 000003 LETTN
0000 R 000004 LETTS    0000 R 000005 LETTW    0000 R 000010 MINUS    0000 I 000036 ML       0000 I 000035 MP
0000 D 000025 NORTH    0000 R 000007 PLUS     0000 R 000011 Q        0000 D 000013 SK       0000 D 000021 SL
0000 I 000002 UZONE    0000 R 000012 SQ       0000 R 000033 S1       0000 R 000034 S2       0000 D 000015 THET
```

```
00101    1*        SUBROUTINE COORMS (INST,QSQ,XYMIL,SZONE,XSTP,YSTP,JERR)
00101    2*   C
00101    3*   C    SUBROUTINE COORMS
00101    4*   C    H.O. EBERHART  -  DECEMBER 1977
00101    5*   C    TEL (301) 671 3125
00101    6*   C
00101    7*   C    POTOMAC RESEARCH, INC.
00101    8*   C
00101    9*   C
00101   10*   C    THIS SUBROUTINE CONVERTS      MILITARY TO STATE COORDINATES
00101   11*   C                                     -
00101   12*   C                   .
00101   13*   C
00101   14*   C
00101   15*   C    CALLING SEQUENCE:
00101   16*   C    *
00101   17*   C    CALL COORMS (INST,QSQ,XYMIL,SZONE,XSTP,YSTP,JERR)
00101   18*   C         INST   -- I  HOLLERITH   INSTALLATION
00101   19*   C         QSQ    -- I  HOLLERITH   QUADRANGLE ROW &
00101   20*   C                                  100,000 M. SQUARE
00101   21*   C         XYMIL  -- I  D.P.        COORDINATE STRING MIL.
00101   22*   C         SZONE  -- O  INTEGER     STATE ZONE NUMBER
00101   23*   C         XSTP   -- I  O  D.P.     X COORDINATE STATE
00101   24*   C         YSTP   -- O  D.P.        Y COORDINATE STATE
00101   25*   C         JERR   -- O  INTEGER     ERROR CODE
00101   26*   C
00101   27*   C    *
00101   28*   C
00101   29*   C    CONVENTIONS:
00101   30*   C
00101   31*   C         + LATITUDE    NORTHERN HEMISPHERE
00101   32*   C         - LATITUDE    SOUTHERN
00101   33*   C
00101   34*   C         + LONGITUDE   WESTERN
00101   35*   C         - LONGITUDE   EASTERN
00101   36*   C
```

```
                C     + UTM ZONE    NORTHERN HEMISPHERE
                C     - UTM ZONE    SOUTHERN
                C
                C         CLARKE 1866 SPHEROID
                C
                C
                      INTEGER DP,DL,SZONE,UZONE
                      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
                      DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,XYMIL,XSTP,YSTP
                      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
                      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
                C
                C
                C
                      JERR=0
                C
                C         GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
                C
                   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
                C
                      IF (H1.EQ.LETTN)        S1=PLUS
                      IF (H1.EQ.LETTS)        S1=MINUS
                      IF (H2.EQ.LETTW)        S2=PLUS
                      IF (H2.EQ.LETTE)        S2=MINUS
                C
                   70 Q =6H
                      SQ=6H
                      FLD(0,6,0)  =FLD(0,6,QSQ)
                      FLD(0,12,SQ)=FLD(6,12,QSQ)
                C
                      IF (XYMIL.EQ.0.0D0)      GOTO 8040
                      IF (QSQ.EQ.BLANK)        GOTO 8060
                      CALL CONVMU (1,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
                      IF (JERR.GT.0)           GOTO 9999
                      CALL CONVGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
                     *               JERR)
                      IF (JERR.GT.0)           GOTO 9999
                      CALL CONVGS (1,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
                      GOTO 9999
                C------------------
                C
                C         INVALID INSTALLATION  --  2 ALPHABETIC
                C
                 8000 JERR=1
                      GOTO 9100
                C
                C         MISSING INPUT COORDINATES
                C
                 8040 JERR=2
                      GOTO 9100
                C
                C         MISSING 3 LETTERS  --  QUADRANGLE & 100,000 M. SQUARE
                C
                 8060 JERR=3
                      GOTO 9100
                C
                 9100 XSTP=0.0D0
                      YSTP=0.0D0
```

```
******  COORMU  ******

00162    95*          GOTO 9999
00162    96*    C
00162    97*    C
00163    98*  9999 RETURN
00164    99*          END

     END OF COMPILATION:       NO   DIAGNOSTICS.


*HDG.P ****** COORMU ******

@FOR.S CVCOORD.COORMU.TPFS.COORMU
FOR S0E3-05/17/78-08:32:34 (1.)


SUBROUTINE COORMU    ENTRY POINT 0C0116

STORAGE USED: CODE(1) 000146; DATA(0) 000030; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

     0003    ZONE2
     0004    CONVMU
     0005    NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001      000072 8000L      0001      000075 8040L      0C01    0C0100 8C60L      0001      0C0107 0000L
     0000 R    000011 ASTER      0000 R    000012 BLANK      0000 R  0C0013 H1        0000 R    000023 N0005
     0000 R    000004 LETTE      0000 R    000001 LETTN .     0000 R  000002 LETTS     0000 R    000006 N1005
     0000 R    000005 PLUS       0000 R    000007 Q          0000 R  000010 SQ        0000 R    000015 S1
     0000 R    000016 S2
```

```
00101     1*    C    SUBROUTINE COORMU (INST.QSQ.XYMIL.UZONE.EAST.NORTH.JERR)
00101     2*    C
00101     3*    C    SUBROUTINE COORMU
00101     4*    C    H.O. EBERHART  -  DECEMBER 1977
00101     5*    C    TEL (301, 671 3125
00101     6*    C
00101     7*    C    POTOMAC RESEARCH, INC.
00101     8*    C
00101     9*    C
00101    10*    C    THIS SUBROUTINE CONVERTS
00101    11*    C                           MILITARY TO UTM COORDINATES
00101    12*    C                           -
00101    13*    C
00101    14*    C    CALLING SEQUENCE:
00101    15*    C    *
00101    16*    C    *
00101    17*    C         CALL COORMU (INST.QSQ.XYMIL.UZONE.EAST.NORTH.JERR)
```

```
C      INST    --  I     HOLLERITH  INSTALLATION
C      QSQ     --  I     HOLLERITH  QUADRANGLE ROW &
C                                   100,000 M. SQUARE
C      XYMIL   --  I        D.P.    COORDINATE STRING MIL.
C      UZONE   --     O  INTEGER    + OR - UTM ZONE NUMBER
C      EAST    --     O     D.P.    EASTING
C      NORTH   --     O     D.P.    NORTHING
C      JERR    --     O  INTEGER    ERROR CODE
C
C
C    CONVENTIONS:
C
C         + LATITUDE   NORTHERN HEMISPHERE
C         - LATITUDE   SOUTHERN
C
C         + LONGITUDE  WESTERN
C         - LONGITUDE  EASTERN
C
C         + UTM ZONE   NORTHERN HEMISPHERE
C         - UTM ZONE   SOUTHERN
C
C         CLARKE 1866 SPHEROID
C
       INTEGER SZONE,UZONE
       REAL LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
       DOUBLE PRECISION EAST,NORTH,XYMIL
       DATA ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
       DATA LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
       JERR=0
C
C      GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
C
   50  CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
C
       IF (H1.EQ.LETTN)      S1=PLUS
       IF (H1.EQ.LETTS)      S1=MINUS
       IF (H2.EQ.LETTW)      S2=PLUS
       IF (H2.EQ.LETTE)      S2=MINUS
C
   70  Q =6H
       SQ=6H
       FLD(0,6,Q)  =FLD(0,6,QSQ)
       FLD(0,12,SQ)=FLD(6,12,QSQ)
C
       IF (XYMIL.EQ.0.0D0)    GOTO 8040
       IF (QSQ.EQ.BLANK)      GOTO 8060
       CALL CONVHU (1,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
       GOTO 9999
C---------------
C
C      INVALID INSTALLATION -- 2 ALPHABETIC
C
 8000  JERR=1
```

```
......  CODING  ......

00145   76*              GOTO 9150
00145   77*       C
00145   78*       C      MISSING INPUT COORDINATES
00145   79*       C
00146   80*  8040 JERR=2
00147   81*              GOTO 9150
00147   82*       C
00147   83*       C      MISSING 3 LETTERS  --  QUADRANGLE & 100,000 M. SQUARE
00147   84*       C
00150   85*  8060 JERR=3
00151   86*              GOTO 9150
00151   87*       C
00152   88*  9150 EAST =0.0D0
00153   89*              NORTH=0.0D0
00154   90*              GOTO 9999
00154   91*       C
00154   92*       C
00155   93*  9999 RETURN
00156   94*              END
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** COORSG ******

@FOR.S CVCOORD.COORSG.TPF$.COORSG
FOR S0E3-05/17/78-08:32:52 (2.)

SUBROUTINE COORSG   ENTRY POINT 000144

STORAGE USED: CODE(1) 000200: DATA(0) 000035: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003  ZONE2
0004  CONVGS
0005  NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000060 8000L    0001   000063 8040L    0001   000066 9000L    0001   000072 9540L    0001   000135 9990L
0000 R 000016 ASTER    0000 R 000017 BLANK    0000 I 000001 DL       0000   000000 DP        0000   000031 INJP$
0000 R 000007 LETTE    0000 R 000004 LETTN    0000 R 000005 LETTS    0000 R 000000 LETTW     0000 R 000011 MINUS
0000 I 000023 ML       0000 I 000022 NP       0000 R 000010 PLUS     0000 D 000014 SL        0000 D 000012 SP
0000 I 000002 SZONE    0000 R 000020 S1       0000 R 000021 S2       0000 I 000003 UZONE
```

SUBROUTINE COORSG (INST,XSTP,YSTP,H1,PHI,H2,LAM,JERR)

```
00101   1*       
00101   2*       C       SUBROUTINE COORSG
00101   3*       C
```

```
*****   LINRDU   *****

C
C     H.O. EBERHART  -  DECEMBER 1977
C     TEL (301) 671 3125
C
C     POTOMAC RESEARCH. INC.
C
C     THIS SUBROUTINE CONVERTS STATE TO GEOGRAPHIC COORDINATES
C
C
C     CALLING SEQUENCE:
C
C        CALL COORSG (INST,XSTP,YSTP,H1,PHI,H2,LAM,JERR)
C            INST   -- I    HOLLERITH   INSTALLATION
C            XSTP   -- I    D.P.        X COORDINATE STATE
C            YSTP   -- I    D.P.        Y COORDINATE STATE
C            H1     -- O    HOLLERITH   HEMISPHERE (N.S)
C            PHI    -- O    D.P.        LATITUDE
C            H2     -- O    HOLLERITH   HEMISPHERE (W.E)
C            LAM    -- O    D.P.        LONGITUDE
C            JERR   -- O    INTEGER     ERROR CODE
C
C
C     CONVENTIONS:
C
C            +  LATITUDE    NORTHERN HEMISPHERE
C            -  LATITUDE    SOUTHERN
C
C            +  LONGITUDE   WESTERN
C            -  LONGITUDE   EASTERN
C
C            +  UTM ZONE .  NORTHERN HEMISPHERE
C            -  UTM ZONE .  SOUTHERN
C
C            CLARKE 1866 SPHEROID
C
C
      INTEGER DP,DL,SZONE,UZONE
      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS
      DOUBLE PRECISION DP,DL,XSTP,YSTP,PHI,LAM
      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
C     JERR=0
C
C     GET HEMISPHERE INDICATORS. UTM ZONE, STATE ZONE
C
   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$5000)
C
         IF (H1.EQ.LETTN)       S1=PLUS
         IF (H1.EQ.LETTS)       S1=MINUS
         IF (H2.EQ.LETTW)       S2=PLUS
         IF (H2.EQ.LETTE)       S2=MINUS
C
```

```
******  COORSM  ******

00132   62*          IF (XSTP.EQ.0.0D0)          GOTO 8040
00134   63*          CALL CONVGS (2,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
00135   64*          GOTO 9540
00135   65*  C----------------
00135   66*  C
00135   67*  C          INVALID INSTALLATION  --  2 ALPHABETIC
00135   68*  C
00136   69*  8000 JERR=1
00137   70*          GOTO 9000
00137   71*  C
00137   72*  C          MISSING INPUT COORDINATES
00137   73*  C
00140   74*  8040 JERR=2
00141   75*          GOTO 9000
00141   76*  C
00142   77*  9000 PHI=0.0D0
00143   78*          LAM=0.0D0
00144   79*          GOTO 9999
00144   80*  C
00145   81*  9540 PHI=DFLOAT(DP*10000)+DFLOAT(MP*100)+SP
00146   82*          LAM=DFLOAT(DL*10000)+DFLOAT(ML*100)+SL
00147   83*          GOTO 9999
00147   84*  C
00147   85*  C
00150   86*  9999 RETURN
00151   87*          END


      END OF COMPILATION:          NO   DIAGNOSTICS.


@HDG.P ****** COORSM ******

@FOR.S CVCOORD.COORSM.TPFS.COORSM
FOR S0E3-05/17/78-08:33:05 (2.)


SUBROUTINE COORSM     ENTRY POINT 000155

STORAGE USED: CODE(1) 000213: DATA(0) 000050: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

0003   ZONE2
0004   CONVGS
0005   CONVGU
0006   CONVMU
0007   NERR3$

STORAGE ASSIGNMENT  (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001 000121 8000L      0001 000124 8040L      0001 000127 9050L      0001 000132 9500L      0001 000146 9999L
0000 R 000027 ASTER    0000 R 000030 BLANK    0000 I 000001 DL       0000 I 000000 DP       0000 D 000023 EAST
0000 R 000031 H1       0000 R 000032 H2       0000 000044 INJP$      0000 R 000006 LETTE   0000 R 000003 LETTN
```

```
......  COORSM  ......
0000 R 000004 LETTS      0000 R 000005 LETTW      0000 R 000004 MINUS      0000 I 000036 ML      0000 I 000035 MP
0000 D 000025 NORTH      0000 R 000007 PLUS       0000 R 000011 Q         0000 D 000013 SK      0000 D 000021 SL
0000 D 000017 SP         0000 R 000012 SQ         0000 I 000002 SZONE     0000 R 000033 S1      0000 R 000034 S2
0000 D 000015 THET
```

```
                     SUBROUTINE COORSM (INST,XSTP,YSTP,UZONE,QSQ,XYMIL,JERR)

   1*  C
   2*  C              SUBROUTINE COORSM
   3*  C              H.O. EBERHART  -   DECEMBER 1977
   4*  C              TEL (301) 671 3125
   5*  C
   6*  C
   7*  C              POTOMAC RESEARCH, INC.
   8*  C
   9*  C
  10*  C              THIS SUBROUTINE CONVERTS
  11*  C                              STATE TO MILITARY COORDINATES
  12*  C                                 -           -
  13*  C
  14*  C
  15*  C              CALLING SEQUENCE:
  16*  C              *
  17*  C              CALL COORSM (INST,XSTP,YSTP,UZONE,QSQ,XYMIL,JERR)
  18*  C                 INST    --   I    HOLLERITH  INSTALLATION
  19*  C                 XSTP    --   I    D.P.       X COORDINATE STATE
  20*  C                 YSTP    --   I    D.P.       Y COORDINATE STATE
  21*  C                 UZONE   --   O    INTEGER    + OR - UTM ZONE NUMBER
  22*  C                 QSQ     --   O    HOLLERITH  QUADRANGLE ROW &
  23*  C                                             100,000 M. SQUARE
  24*  C                 XYMIL   --   O    D.P.       COORDINATE STRING MIL.
  25*  C                 JERR    --   O    INTEGER    ERROR CODE
  26*  C
  27*  C                   *
  28*  C
  29*  C              CONVENTIONS:
  30*  C
  31*  C                 + LATITUDE     NORTHERN HEMISPHERE
  32*  C                 - LATITUDE     SOUTHERN
  33*  C
  34*  C                 + LONGITUDE    WESTERN
  35*  C                 - LONGITUDE    EASTERN
  36*  C
  37*  C                 + UTM ZONE     NORTHERN HEMISPHERE
  38*  C                 - UTM ZONE     SOUTHERN
  39*  C
  40*  C                 CLARKE 1866 SPHEROID
  41*  C
  42*  C
  43*  C          INTEGER DP,DL,SZONE,UZONE
  44*        REAL  LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
  45*        DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,XYMIL,XSTP,YSTP
  46*        DATA  ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
  47*        DATA  LETTN,LETTS,LETTE,LETTW,LETTE/1HN,1HS,1HW,1HE/
  48*  C
  49*  C
  50*  C
```

(column codes at left, repeated: 00101 ... 00103 00104 00105 00106 00113 00113 00113 00113)

```
COORSU ******

51*         JERR=0
52* C
53* C       GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
54* C
55* 50   CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$6000)
56* C
57*        IF (H1.EQ.LETTN)        S1=PLUS
58*        IF (H1.EQ.LETTS)        S1=MINUS
59*        IF (H2.EQ.LETTN)        S2=PLUS
60*        IF (H2.EQ.LETTE)        S2=MINUS
61* C
62*        IF (XSTP.EQ.0.0D0)       GOTO 8040
63*        CALL CONVGS (2,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
64*        IF (JERR.GT.0)           GOTO 9999
65*        CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
66* *       JERR)
67*        IF (JERR.GT.0)           GOTO 9999
68*        CALL CONVNU (2,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
69*        GOTO 9500
70* C-----------------
71* C
72* C       INVALID INSTALLATION  --  2 ALPHABETIC
73* C
74* 8000 JERR=1
75*        GOTO 9050
76* C
77* C       MISSING INPUT COORDINATES
78* C
79* 8040 JERR=2
80*        GOTO 9050
81* C
82* 9050 XYMIL=0.0D0
83*        GOTO 9999
84* C
85* 9500 QSQ=6H
86*        FLD(0,6,QSQ) =FLD(0,6,Q)
87*        FLD(6,12,QSQ)=FLD(0,12,SQ)
88*        GOTO 9999
89* C
90* C
91* 9999 RETURN
92*        END
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** COORSU ******

@FOR.S CVCOORD.COORSU.TPF$.COORSU
FOR S0E3-05/17/78-08:33:25 (2.)

SUBROUTINE COORSU   ENTRY POINT 000125

STORAGE USED: CODE(1) 000156; DATA(0) 000041; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

```
0003   ZONE2
0004   CONVGS
0005   CONVGU
0006   NERR3$
```

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```
0001   000104 8000L    0001   000107 8040L    0001   000112 9150L    0001   000116 9999L    0001   R 000021 ASTER
0000 R 000022 BLANK    0000 I 00C001 DL       0000 I 000000 DP       0000 R 000023 H1       0000 R 000024 H2
0000   000035 INUPS    0000 R 000006 LETTE    0000 R 000003 LETTN    0000 R 000004 LETTS    0000 R 000005 LETTW
0000 R 000010 MINUS    0000 I 000030 ML       0000 I 000027 MP       0000 R 000007 PLUS     0000 D 000011 SK
0000 D 000017 SL       0000 D 000015 SP       0000 I 000002 SZONE    0000 R 000025 S1       0000 R 000026 S2
0000 D 000013 THET
```

```
          1*        SUBROUTINE COORSU (INST,XSTP,YSTP,UZONE,EAST,NORTH,JERR)
       C  2*
       C  3*        SUBROUTINE COORSU
       C  4*        H.O. EBERHART  -  DECEMBER 1977
       C  5*        TEL (301) 671 3125
       C  6*
       C  7*        POTOMAC RESEARCH. INC.
       C  8*
       C  9*
       C 10*        THIS SUBROUTINE CONVERTS
       C 11*                               STATE TO UTM COORDINATES
       C 12*                               _
       C 13*
       C 14*        CALLING SEQUENCE:
       C 15*        *
       C 16*        CALL COORSU (INST,XSTP,YSTP,UZONE,EAST,NORTH,JERR)
       C 17*        INST   -- I  HOLLERITH  INSTALLATION
       C 18*        XSTP   -- I  D.P.       X COORDINATE STATE
       C 19*        YSTP   -- I  D.P.       Y COORDINATE STATE
       C 20*        UZONE  -- I  INTEGER    + OR - UTM ZONE NUMBER
       C 21*        EAST   -- O  D.P.       EASTING
       C 22*        NORTH  -- O  D.P.       NORTHING
       C 23*        JERR   -- O  INTEGER    ERROR CODE
       C 24*
       C 25*        *
       C 26*
       C 27*        CONVENTIONS:
       C 28*
       C 29*        + LATITUDE    NORTHERN HEMISPHERE
       C 30*        - LATITUDE    SOUTHERN
       C 31*
       C 32*        + LONGITUDE   WESTERN
       C 33*        - LONGITUDE   EASTERN
       C 34*
       C 35*        + UTM ZONE    NORTHERN HEMISPHERE
       C 36*        - UTM ZONE    SOUTHERN
```

```
****** COURSU ******

00101   39*   C                CLARKE 1866 SPHEROID          000000
00101   40*   C                                              000000
00101   41*   C                                              000000
00103   42*         INTEGER DP,DL,SZONE,UZONE                000000
00104   43*         REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS   000000
00105   44*         DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,XSTP,YSTP  000000
00106   45*         DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/     000000
00113   46*         DATA    LETTN,LETTS,LETTE,LETTE/1HN,1HS,1HW,1HE/    000000
00113   47*   C                                              000000
00113   48*   C                                              000000
00113   49*         JERR=0                                   000000
00120   50*   C                                              000000
00120   51*   C                                              000000
00120   52*   C     GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE    000000
00120   53*   C                                              000000
00121   54*    50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)  000000
00121   55*   C                                              000000
00122   56*         IF (H1.EQ.LETTN)       S1=PLUS            000010
00124   57*         IF (H1.EQ.LETTS)       S1=MINUS           000015
00126   58*         IF (H2.EQ.LETTW)       S2=PLUS            000022
00130   59*         IF (H2.EQ.LETTE)       S2=MINUS           000027
00130   60*   C                                              000037
00132   61*         IF (XSTP.EQ.0.0D0)     GOTO 8040 .        000037
00134   62*         CALL CCNVGS (2,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)  000037
00135   63*         IF (JERR.GT.0)         GOTO 9999          000050
00137   64*         CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,  000041
00137         *         JERR)                                 000041
00140   65*   *                                              000102
00140   66*         GOTO 9999                                000102
00140   67*   C--------------------------                    000102
00140   68*   C                                              000102
00140   69*   C     INVALID INSTALLATION  --  2 ALPHABETIC    000102
00140   70*   C                                              000102
00141   71*   8000 JERR=1                                    000105
00142   72*         GOTO 9150                                000105
00142   73*   C                                              000106
00142   74*   C     MISSING INPUT COORDINATES                000106
00142   75*   C                                              000107
00143   76*   8040 JERR=2                                    000107
00144   77*         GOTO 9150                                000110
00144   78*   C                                              000110
00145   79*   9150 EAST =0.0D0                               000112
00146   80*         NORTH=0.0D0                              000113
00147   81*         GOTO 9999                                000113
00147   82*   C                                              000114
00147   83*   C                                              000114
00150   84*   9999 RETURN                                    000116
00151   85*         END                                      000155


END OF COMPILATION:        NO   DIAGNOSTICS.

@HDG.P ****** COORUG ******

@FOR.S CVCOORD.COORUG.TPF$.COORUG
FOR S0E3-05/17/78-08:33:45 (2.)
```

****** COORUG ******

SUBROUTINE COORUG   ENTRY POINT 000146

STORAGE USED: CODE(1) 000202; DATA(0) 000041; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003   ZONE2
0004   CONVGU
0005   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001    000062 8000L   0001   000065 3040L   0001   000070 9000L   0001   000074 9540L   0001   000137 9999L
0000 R  000022 ASTER   0000 R 000023 BLANK   0000 I 000001 DL      0000 I 000000 CP       0000   000035 INDPS
0000 R  000007 LETTE   0000 R 000004 LETTN   0000 R 000005 LETTS   0000 R 000006 LETTW    0000 R 000011 MINUS
0000 I  000027 ML      0000 I 000026 MP      0000 R 000010 PLUS    0000 R 000012 SK       0000 R 000020 SL
0000 D  000016 SP      0000 I 000002 SZONE   0000 R 000024 S1      0000 R 000025 S2       0000 D 000014 THET
0000 I  000003 UZONE
```

```
C                SUBROUTINE COORUG (INST,EAST,NORTH,H1,PHI,H2,LAM,JERR)
00101   1*    C
00101   2*    C       SUBROUTINE COORUG
00101   3*    C       H.O. EBERHART -   DECEMBER 1977
00101   4*    C       TEL (301) 671 3125
00101   5*    C
00101   6*    C       POTOMAC RESEARCH, INC.
00101   7*    C
00101   8*    C       THIS SUBROUTINE CONVERTS-
00101   9*    C                      UTM TO GEOGRAPHIC COORDINATES
00101  10*    C                       -      -
00101  11*    C
00101  12*    C       CALLING SEQUENCE:
00101  13*    C       *
00101  14*    C       CALL COORUG (INST,EAST,NORTH,H2,PHI,H2,LAM,JERR)
00101  15*    C           INST   -- I   HOLLERITH   INSTALLATION
00101  16*    C           EAST   -- I   D.P.        EASTING
00101  17*    C           NORTH  -- I   D.P.        NORTHING
00101  18*    C           H1     -- O   HOLLERITH   HEMISPHERE (N,S)
00101  19*    C           PHI    -- O   (I.P.)      LATITUDE
00101  20*    C           H2     -- O   HOLLERITH   HEMISPHERE (W,E)
00101  21*    C           LAM    -- O   D.P.        LONGITUDE
00101  22*    C           JERR   -- O   INTEGER     ERROR CODE
00101  23*    C       *
00101  24*    C       CONVENTIONS:
00101  25*    C           + LATITUDE   NORTHERN HEMISPHERE
00101  26*    C           - LATITUDE   SOUTHERN
00101  27*    C
00101  28*    C
00101  29*    C
00101  30*    C
00101  31*    C
00101  32*    C
00101  33*    C
```

```
C        + LONGITUDE    WESTERN
C        - LONGITUDE    EASTERN
C
C        + UTM ZONE     NORTHERN HEMISPHERE
C        - UTM ZONE     SOUTHERN
C
C        CLARKE 1866 SPHEROID
C
      INTEGER DP,DL,SZONE,UZONE
      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS
      DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM
      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
C
      JERR=0
C
C        GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
C
   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
C
      IF (H1.EQ.LETTN)          S1=PLUS
      IF (H1.EQ.LETTS)          S1=MINUS
      IF (H2.EQ.LETTW)          S2=PLUS
      IF (H2.EQ.LETTE)          S2=MINUS
C
      IF (EAST.EQ.0.0D0)        GOTO 8040
      CALL CONVGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
     *             JERR)
      GOTO 9540
C--------------
C
C        INVALID INSTALLATION. --  2 ALPHABETIC
C
 8000 JERR=1
      GOTO 9000
C
C        MISSING INPUT COORDINATES
C
 8040 JERR=2
      GOTO 9000
C
 9000 PHI=0.0D0
      LAM=0.0D0
      GOTO 9999
C
 9540 PHI=DFLOAT(DP*10000)+DFLOAT(MP*100)+SP
      LAM=DFLOAT(DL*10000)+DFLOAT(ML*100)+SL
      GOTO 9999
C
C
 9999 RETURN
      END
```

END OF COMPILATION: NO   DIAGNOSTICS.

```
...... COORUM ......

@HDG.P ****** COORUM ******

@FOR.S CVCOORD.COORUM.TPFS.COORUM
FOR SOE3-05/17/78-08:33:57 (1.)


SUBROUTINE COORUM    ENTRY POINT 000107

STORAGE USED: CODE(1) 000140; DATA(0) 000027; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003    ZONE2
0004    CONVMU
0005    NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001   000053 8000L   0001   000056 8040L   0001   000061 9050L   0001   000064 9500L   0001   000100 9990L
0000 R 000011 ASTER   0000 R 000012 BLANK   0000 R 000013 H1      0000 R 000014 H2      0000   000023 INJPS
0000 R 000004 LETTE   0000 R 000001 LETTN   0000 R 000002 LETTS   0000 R 000003 LETTW   0000 R 000006 MINUS
0000 R 000005 PLUS    0000 R 000007 Q       0000 R 000010 SQ      0000 I 000000 SZONE   0000 R 000015 S1
0000 R 000016 S2
```

```
00101    1*        SUBROUTINE COORUM (INST,EAST,NORTH,UZONE,QSQ,XYMIL,JERR)
00101    2*  C
00101    3*  C     SUBROUTINE COORUM
00101    4*  C     H.O. EBERHART  -  DECEMBER 1977
00101    5*  C     TEL (301) 671 3125
00101    6*  C
00101    7*  C     POTOMAC RESEARCH. INC.
00101    8*  C
00101    9*  C
00101   10*  C     THIS SUBROUTINE CONVERTS
00101   11*  C                          UTM TO MILITARY COORDINATES
00101   12*  C                           -      -
00101   13*  C
00101   14*  C
00101   15*  C     CALLING SEQUENCE:
00101   16*  C     *
00101   17*  C     CALL COORUM (INST,EAST,NORTH,UZONE,QSQ,XYMIL,JERR)
00101   18*  C     INST   -- I   HOLLERITH  INSTALLATION
00101   19*  C     EAST   -- I   D.P.       EASTING
00101   20*  C     NORTH  -- I   D.P.       NORTHING
00101   21*  C     UZONE  -- O   INTEGER    + OR - UTM ZONE NUMBER
00101   22*  C     QSQ    -- O   HOLLERITH  QUADRANGLE ROW &
00101   23*  C                                 100,000 M. SQUARE
00101   24*  C     XYMIL  -- O   D.P.       COORDINATE STRING MIL.
00101   25*  C     JERR   -- O   INTEGER    ERROR CODE
00101   26*  C
00101   27*  C     *
```

```
C
C        CONVENTIONS:
C
C              + LATITUDE        NORTHERN HEMISPHERE
C              - LATITUDE        SOUTHERN
C
C              + LONGITUDE       WESTERN
C              - LONGITUDE       EASTERN
C
C              + UTM ZONE        NORTHERN HEMISPHERE
C              - UTM ZONE        SOUTHERN
C
C                    CLARKE 1866 SPHEROID
C
C
      INTEGER SZONE,UZONE
      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
      DOUBLE PRECISION EAST,NORTH,XYMIL
      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
C
      JERR=0
C
C        GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
C
   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
C
      IF (H1.EQ.LETTN)           S1=PLUS
      IF (H1.EQ.LETTS)           S1=MINUS
      IF (H2.EQ.LETTW)           S2=PLUS
      IF (H2.EQ.LETTE)           S2=MINUS
C
      IF (EAST.EQ.0.0D0)        GOTO 8040
C
      CALL CONVMU (2,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
      GOTO 9500
C-------------
C
C        INVALID INSTALLATION  --  2 ALPHABETIC
C
 8000 JERR=1
      GOTO 9050
C
C        MISSING INPUT COORDINATES
C
 8040 JERR=2
      GOTO 9050
C
 9050 XYMIL=0.0D0
      GOTO 9999
C
 9500 Q,SQ=6H
      FLD(2,6,QSQ) =FLD(0,6,Q)
      FLD(6,12,QSQ)=FLD(0,12,SQ)
      GOTO 9999
C
```

```
......  COORUM  ......
00147    86.    C
00150    57.       9599 RETURN
00151    88.       END

         END OF COMPILATION:        NO  DIAGNOSTICS.

@HDG.P  ......  COORUS  ......

@FOR.S CVCOORD.COORUS.TPFS.COORUS
FOR SOE3-05/17/78-08:34:09 (2.)

SUBROUTINE COORUS    ENTRY POINT 000125

STORAGE USED: CODE(1) 000156; DATA(0) 000041; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

    0003    ZONE2
    0004    CONVGU
    0005    CONVGS
    0006    NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)
```

```
0001   000104 8000L       0001   000107 8040L       0001   000112 9100L       0001   000116 9990L       0000 R 000021 ASTER
0000 R 000022 BLANK       0000 I 000001 DL          0000 I 000000 DP          0000 R 000023 H1          0000 R 000024 H2
0000   000035 INJP$       0000 R 000006 LETTE       0000 R 000003 LETTN       0000 R 000004 LETTS       0000 R 000005 LETTW
0000 R 000010 MINUS       0000 I 000030 ML          0000 I 000027 MP          0000 R 000007 PLUS        0000 D 000011 SK
0000 D 000017 SL          0000 D 000015 SP          0000 R 000025 S1          0000 R 000026 S2          0000 D 000013 THET
0000 I 000002 UZONE
```

```
00101    1*        SUBROUTINE COORUS (INST,EAST,NORTH,SZONE,XSTP,YSTP,JERR)
00101    2*     C
00101    3*     C      SUBROUTINE COORUS
00101    4*     C      H.O. EBERHART -  DECEMBER 1977
00101    5*     C      TEL (301) 671 3125
00101    6*     C
00101    7*     C      POTOMAC RESEARCH, INC.
00101    8*     C
00101    9*     C      THIS SUBROUTINE CONVERTS  UTM TO STATE COORDINATES
00101   10*     C
00101   11*     C
00101   12*     C
00101   13*     C
00101   14*     C      CALLING SEQUENCE:
00101   15*     C            *
00101   16*     C            CALL COORUS (INST,EAST,NORTH,SZONE,XSTP,YSTP,JERR)
00101   17*     C
```

```
000076
000100
000137
```

```
C
C
C      INST    --  I    HOLLERITH  INSTALLATION
C      EAST    --  I    D.P.       EASTING
C      NORTH   --  I    D.P.       NORTHING
C      SZONE   --  I  O INTEGER    STATE ZONE NUMBER
C      XSTP    --  I  O D.P.       X COORDINATE STATE
C      YSTP    --  I  O D.P.       Y COORDINATE STATE
C      JERR    --  I  O INTEGER    ERROR CODE
C
C
C          *
C
C   CONVENTIONS:
C
C      + LATITUDE     NORTHERN HEMISPHERE
C      - LATITUDE     SOUTHERN
C
C      + LONGITUDE    WESTERN
C      - LONGITUDE    EASTERN
C
C      + UTM ZONE     NORTHERN HEMISPHERE
C      - UTM ZONE     SOUTHERN
C
C      CLARKE 1866 SPHEROID
C
C
      INTEGER DP,DL,SZONE,UZONE
      REAL    LETTN,LETTS,LETTW,LETTE,PLUS,MINUS
      DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,XSTP,YSTP
      DATA    ASTER,BLANK,PLUS,MINUS/1H*,1H ,1H+,1H-/
      DATA    LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/
C
C
      JERR=0
C
C      GET HEMISPHERE INDICATORS, UTM ZONE,  STATE ZONE
C
   50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)
C
      IF (H1.EQ.LETTN)       S1=PLUS
      IF (H1.EQ.LETTS)       S1=MINUS
      IF (H2.EQ.LETTW)       S2=PLUS
      IF (H2.EQ.LETTE)       S2=MINUS
C
      IF (EAST.EQ.0.0D0)      GOTO 8040
      CALL CONVGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
     * JERR)
      IF (JERR.GT.0)      GOTO 9999
      CALL CONVGS (1,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
      GOTO 9999
C------------------------------
C
C      INVALID INSTALLATION  --  2 ALPHABETIC
C
 8000 JERR=1
      GOTO 9100
C
C      MISSING INPUT COORDINATES
C
```

```
  00143    76*        8040 JERR=2
  00144    77*             GOTO 9100
  00144    78*      C
  00145    79*        9100 XSTP=0.0D0
  00146    80*             YSTP=0.0D0
  00147    81*             GOTO 9999
  00147    82*      C
  00150    83*      C
  00150    84*        9999 RETURN
  00151    85*             END
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** FILA ******

@FOR.S CVCOORD.FILA.TPF$.FILA
FOR S0E3-05/17/78-08:34:25 (0.)

SUBROUTINE FILA   ENTRY POINT 000:40

STORAGE USED: CODE(1) 000147; DATA(0) 001120; BLANK COMMON(2) 000000

COMMON BLOCKS:

  0003   CONST 010150

EXTERNAL REFERENCES (BLOCK, NAME)

  0004   NE   ?$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001 000003 114G    0001 000017 120G    0001 000037 127G    0001 000053 133G    0001 000073 142G
0001 000107 146G    0003 D 000000 A     0000 D 000000 A1    0000 D 000276 A2    0000 D 000574 A3
0000 I 001072 I     0000 I 001075 I     0000 I 001073 IZ    0000 I 001074 J     0000 I 001075 K
```

```
  00101    1*      SUBROUTINE FILA
  00103    2*      DOUBLE PRECISION A1(5,19),A2(5,19),A3(5,19),A(150,14)
  00104    3*      COMMON /CONST/ A
  00105    4*      DATA A1/
  00105    5*    *  0.31010 1.50000 0.00000 0.30900 0.0D0,0.99996000000D0,.3375350.66200.    000003
  00105    6*    1  0.31560 1.50000 0.00000 0.31500 0.0D0,0.999933333333D0,.33193,3.29200.   000003
  00105    7*    2  0.31510 1.50000 0.00000 0.31400 0.0D0,0.999900000000D0,.34307,0.30900.   000003
  00105    8*    3  0.31760 1.50000 0.00000 0.31400 0.0D0,0.999000000000D0,.34337,0.34300.   000003
  00105    9*    4  0.31010 1.50000 0.00000 0.32600 0.0D0,0.999333333300D0,.34907,0.34300.   000003
  00105   10*    5  0.30510 1.50000 0.00000 0.27150 0.0D0,0.999950028100D0,.42072,2.2C100.   000003
  00105   11*    6  0.31010 1.50000 0.00000 0.24100 0.0D0,0.999941176500D0,.269205,4.25100.  000003
  00105   12*    7  0.36260 1.50000 0.00000 0.29520 0.0D0,0.999941176500D0,.269205,4.25100.  000003
```

```
      8         0.3651D4.500000.0D0.0.275800.0D0.0.999900000000.3319933.29000.
      9         0.3676D4.500000.0D0.0.303800.0D0.0.999900000000.3319933.29000.
      *         0.3701D4.500000.0D0.0.403800.0D0.0.999917308400.4614400.42300.
      1         0.3726D4.500000.0D0.0.410400.0D0.0.999917308400.4614400.42300.
      2         0.3751D4.500000.0D0.0.416700.0D0.0.999933333300.4614400.42300.
      3         0.3776D4.500000.0D0.0.315800.0D0.0.999975000000.4059317.06800.
      4         0.3801D4.500000.0D0.0.324600.0D0.0.999941176500.4059317.06800.
      5         0.3826D4.500000.0D0.0.308400.0D0.0.999966667700.4151797.60700.
      6         0.3851D4.500000.0D0.0.313500.0D0.0.999966667700.4151797.60700.
      7         0.3876D4.500000.0D0.0.246600.0D0.0.999900000000.4655087.84200.
      8         0.4101D4.500000.0D0.0.252600.0D0.0.999966666700.4743989.85600/
      DATA A2 /
      *         0.4201D4.500000.0D0.0.301200.0D0.0.999942857100.4595689.82600.
      1         0.4226D4.500000.0D0.0.307300.0D0.0.999956694900.4595689.82600.
      2         0.4251D4.500000.0D0.0.319500.0D0.0.999906090900.4595689.82500.
      3         0.4351D4.500000.0D0.0.319800.0D0.0.999900000000.3282944.70000.
      4         0.4376D4.500000.0D0.0.325200.0D0.0.999941176500.3375319.65200.
      5         0.4401D4.500000.0D0.0.325800.0D0.0.999933333300.3965919.67700.
      6         0.4426D4.500000.0D0.0.333000.0D0.0.999933333300.3965919.67700.
      7         0.4451D4.500000.0D0.0.310200.0D0.0.999941176500.4005855.07500.
      8         0.4801D4.500000.0D0.0.416100.0D0.0.999900000000.3846661.44600.
      9         0.4826D4.500000.0D0.0.420900.0D0.0.999900000000.3846661.44600.
      *         0.4570D4.500000.0D0.0.258000.0D0.0.999960667700.4706661.57500.
      1         0.4701D4.200000.0D0.0.268800.0D0.0.999975029500.4299793.99000.
      2         0.4726D4.500000.0D0.0.375600.0D0.0.999941200000.3430740.32500.
      3         0.4751D4.500000.0D0.0.392500.0D0.0.999900000000.3430740.32800.
      4         0.4776D4.500000.0D0.0.365200.0D0.0.999916666700.3430740.32800.
      5         0.4801D4.500000.0D0.0.247600.0D0.0.999900666700.4429318.90200.
      6         0.4826D4.500000.0D0.0.275700.0D0.0.999937500000.4429318.90300.
      7         0.4851D4.500000.0D0.0.282900.0D0.0.999937500000.4429318.90300/
      DATA A3 /
      *         0.5176D4.500000.0D0.0.257400.0D0.0.999937500000.4549615.72000.
      1         0.5526D4.500000.0D0.0.261000.0D0.0.999982857000.4706641.57500.
      2         0.5776D4.500000.0D0.0.378800.0D0.0.999941176500.4503375.00700.
      3         0.5801D4.500000.0D0.0.386400.0D0.0.999941176500.4503315.00700.
      4         0.5826D4.500000.0D0.0.391500.0D0.0.999941176500.4503315.00700.
      5         0.5851D4.500000.0D0.0.393300.0D0.0.999941176500.4503315.00700.
      6         0.5876D4.500000.0D0.0.559800.0D0.0.999976666700.2083394.67700.
      7         0.5901D4.500000.0D0.0.564000.0D0.0.999900666700.2249134.92200.
      8         0.5926D4.500000.0D0.0.568800.0D0.0.999900000000.2230684.61700.
      9         0.5951D4.500000.0D0.0.574200.0D0.0.999900000000.2415203.94500.
      *         0.5976D4.500000.0D0.0.576600.0D0.0.999929999300.2396720.35700.
      1         0.6126D4.500000.0D0.0.511200.0D0.0.999900000000.5985699.49000.
      2         0.6151D4.500000.0D0.0.525600.0D0.0.999900000000.5985699.49000.
      3         0.6176D4.500000.0D0.0.543000.0D0.0.999900000000.5985699.49000.
      4         0.6201D4.500000.0D0.0.554400.0D0.0.999900000000.5985699.49000.
      5         0.6226D4.500000.0D0.0.568800.0D0.0.999900000000.5985699.49000.
      6         0.6251D4.700000.0D0.0.583200.0D0.0.999900000000.5985699.49000.
      7         0.6276D4.500000.0D0.0.597600.0D0.0.999900000000.5985699.49000.
      8         0.6301D4.600000.0D0.0.612000.0D0.0.999900000000.5985699.49300/
      DO 1 I=1,19
      IZ=(A1(1,I)-3076.0D0)/25.0D0
      DO 1 J=2,5
      K=J-1
    1 A(IZ,K) =A1(J,I)
      DO 2 I=1,19
      IZ=(A2(1,I)-3076.0D0)/25.0D0
```

```
****** FILLA ******

00132  71*          DO 2 J=2.5
00135  72*          K=J-1
00136  73*      2   A(IZ.K)=A2(J.I)
00141  74*          DO 3 I=1.19
00144  75*          IZ=(A3(1.I)-3076.0D0)/25.0D0
00145  76*          DO 3 J=2.5
00150  77*          K=J-1
00151  78*      3   A(IZ.K)=A3(J.I)
00154  79*          RETURN
00155  80*          END
```

```
LA  071  000046
LA  072  000093
LA  073  0000..
LA  074  000073
LA  075  000003
LA  076  000102
LA  077  000107
LA  078  000114
LA  079  000123
LA  080  000146
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** FILLA ******

@FOR.S CVCOORD.FILLA.TPFS.FILLA
FOR S0E3-05/17/78-08:34:46 (0.)

SUBROUTINE FILLA   ENTRY POINT 000715

STORAGE USED: CODE(1) 000723: DATA(0) 003771: BLANK¹ COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR3$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```
0001   000233 10L    0001   000310 12L    0001   000315 13L    0001   000034 134G   0001   000372 15L
0001   000115 151C   0001   000377 16L    0001   000200 174G   0001   000454 18L    0001   000461 19L
0001   000005 2L     0001   000526 21L    0001   000262 214G   0001   000543 22L    0001   000344 234G
0001   000620 24L    0001   000625 25L    0001   000426 254G   0001   000702 27L    0001   000510 274G
0001   000062 3L     0001   000572 314G   0001   000454 334G   0001   000067 4L     0001   000143 6L
0001   000151 7L     0001   000226 9L     0003 D 000000 A      0000 D 000000 A1     0000 D 000340 A2
0000 D 000700 A3     0000 D 001240 A4     0000 D 001600 A5     0000 D 002140 A6     0000 D 002500 A7
0000 D 003040 A8     0000 D 003400 A9     0000 I 003744 I      0000 I 003755 INJP$  0000 I 003743 IZ
0000 I 003740 K      0000 I 003745 KK     0000 I 003741 L      0000 I 003742 N
```

```
LA  001  000000
LA  002  000000
LA  003  000000
LA  004  000000
LA  005  000000
LA  006  000000
```

```
00101  1*      SUBROUTINE FILLA
00103  2*      DOUBLE PRECISION A(150.14),A1(112),A2(112),A3(112),A4(112),A5(112)
00103  3*     *.A6(112),A7(112),A8(112),A9(112)
00104  4*      COMMON/CONST/A
00105  5*      DATA A1 /3226.0D0.2.0D6.3.31205.29277593.61D0.29732882.87D0..99993
00105  6*     *5937D0..58189914070D0.2126.0D0.46.3565600.3.8145200.3.264320.4552.8LLA
```

```
      *0.48.41933D0,3.83899D0,1.51030D0,245257.78D0,1.000006055D0,3.19602LLA
      *9477D0,6326,0D0,3.0D6,6.336D5,1593950.36D0,1656462B.77D0,,9998420LLA
      *641D0,.79692394D0,0.3161.0D0,.47.87063D0,3.79919D0,5.9155CD0.670673LLA
      *.41D0,1.00015195900,1.25482733000/                                LLA
                                                                         LLA
      K=0                                                                LLA
      L=1                                                                LLA
      N=14                                                               LLA
    2 IZ=(A1(L)-3076)/25                                                 LLA
      DO 1 I=L,N                                                         LLA
      KK=I-(K*14)                                                        LLA
    1 A(IZ,KK)=A1(I)                                                     LLA
      K=K+1                                                              LLA
      L=L+14                                                             LLA
      N=N+14                                                             LLA
      IF(K.EQ.8) GO TO 3                                                 LLA
      GO TO 2                                                            LLA
    3 K=0                                                                LLA
      L=1                                                                LLA
      N=14                                                               LLA
    4 IZ=(A2(L)-3076)/25                                                 LLA
      DO 5 I=L,N                                                         LLA
      KK=I-(K*14)                                                        LLA
    5 A(IZ,KK)=A2(I)                                                     LLA
      K=K+1                                                              LLA
      L=L+14                                                             LLA
      N=N+14                                                             LLA
      IF(K.EQ.8) GO TO 6                                                 LLA
      GO TO 4                                                            LLA
    6 K=0                                                                LLA
      L=1                                                                LLA
      N=14                                                               LLA
    7 IZ=(A3(L)-3076)/25                                                 LLA
      DO 8 I=L,N                                                         LLA
      KK=I-(K*14)                                                        LLA
    8 A(IZ,KK)=A3(I)                                                     LLA
      K=K+1                                                              LLA
      L=L+14                                                             LLA
      N=N+14                                                             LLA
      IF(K.EQ.8) GO TO 9                                                 LLA
      GO TO 7                                                            LLA
    9 K=0                                                                LLA
      L=1                                                                LLA
      N=14                                                               LLA
   10 IZ=(A4(L)-3076)/25                                                 LLA
      DO 11 I=L,N                                                        LLA
      KK=I-(K*14)                                                        LLA
   11 A(IZ,KK)=A4(I)                                                     LLA
      K=K+1                                                              LLA
      L=L+14                                                             LLA
      N=N+14                                                             LLA
      IF(K.EQ.8) GO TO 12                                                LLA
      GO TO 10                                                           LLA
   12 K=0                                                                LLA
      L=1                                                                LLA
      N=14                                                               LLA
   13 IZ=(A5(L)-3076)/25                                                 LLA
      DO 14 I=L,N                                                        LLA
      KK=I-(K*14)                                                        LLA
```

```
      14 A(IZ.KK)=A5(I)
         K=K+1
         L=L+14
         N=N+14
         IF(K.EQ.8) GO TO 15
         GO TO 13
      15 K=0
         L=1
         N=14
      16 IZ=(A6(L)-3076)/25
         DO 17 I=L.N
         KK=I-(K+14)
      17 A(IZ.KK)=A6(I)
         K=K+1
         L=L+14
         N=N+14
         IF(K.EQ.8) GO TO 18
         GO TO 16
      18 K=0
         L=1
         N=14
      19 IZ=(A7(L)-3076)/25
         DO 20 I=L.N
         KK=I-(K+14)
      20 A(IZ.KK)=A7(I)
         K=K+1
         L=L+14
         N=N+14
         IF(K.EQ.8) GO TO 21
         GO TO 19
      21 K=0
         L=1
         N=14
      22 IZ=(A8(L)-3076)/25
         DO 23 I=L.N
         KK=I-(K+14)
      23 A(IZ.KK)=A8(I)
         K=K+1
         L=L+14
         N=N+14
         IF(K.EQ.8) GO TO 24
         GO TO 22
      24 K=0
         L=1
         N=14
      25 IZ=(A9(L)-3076)/25
         DO 26 I=L.N
         KK=I-(K+14)
      26 A(IZ.KK)=A9(I)
         K=K+1
         L=L+14
         N=N+14
         IF(K.EQ.8) GO TO 27
         GO TO 25
      27 CONTINUE
         RETURN
         END
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** FILLAA ******

@FOR,S CVCOORD.FILLAA.TPFS.FILLAA
FOR S0E3-05/17/78-08:35:22 (0.)

SUBROUTINE FILLAA   ENTRY POINT 000027

STORAGE USED: CODE(1) 000035: DATA(0) 001015: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 OMF · 001000

EXTERNAL REFERENCES (BLOCK, NAME)

0004 NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001 000003 116G    0001 000003 121G    0003 D 000000 A     0003 D 000000 A1    0000 D 000200 A2
0000 D 000400 A3    0000 D 000600 A4    0000 I 001001 I     0000 001004 INUPS   0000 I 001000 J

      1*       SUBROUTINE FILLAA
      2*       DOUBLE PRECISION A1(8,8),A2(8,8),A3(8,8),A4(8,8),A(4,8,8)
      3*       COMMON /OMF/ A
      4*       DATA A1 /1105343.100300,3044356.210690,129147.627D0,112831.98D0,
      5*      *12241.26D0.5962.0D0.1127.0D0.342.0D0.3071023.019200,-2.5546.252D0,
      6*      *341460.959800,-4939.9600,30071.0D0,-421.500.2416.0D0,-820.0D0,
      7*      *2585.60.60D0,-35547.82700,-59953.25D0,-62507.78D0,-15031.900,
      8*      *-7607.000,-2901.0D0,-710.000.2293.46100,9.35.5630.-53023.84D0,
      9*      *15803.8D0.-12516.3D0.4942.0D0.-1.81D3,9.C02.-197.74200.6522.23D0,
     10*      *4607.6100.9464.0D0.4.4563.2.6103.1.5203.4.0D2.-105.89700,-50.49D0,
     11*      *2463.300.-1.6503D3.2.00200,-1.2903.0.0D0.0.0D0.5.6D0.-24.70D.
     12*      *-133.500.-6.0002.-6.502.-4.102.0.0D0.0.0D0.2.1700.-2.700.-5.2D1.
     13*      *8.3D1.0.0D0.0.0D0.0.0D0.0.0D0/
     14*       DATA A2 / 3319605.325800.2679156.44980D.324722.925D0.52879.03D0.2
     15*      *2481.1800.-635.6D0.1.19403.-2.3802.3077892.015000-746102.079000,
     16*      *182246.837D0.-103308.0900.-3.65203.-4231.2D0.-1.91503.-3.402.6571,
     17*      *405D0.-314852.091D0.-152259.45D0.-6214.300.-24156.890.5.43503.-1.6
     18*      *18D3.9.7D2.1241.84D0.29035.05D0.-28701.1360.317843D0.5712.5D0,
     19*      *4.42D3.2.34D3.0.0D0.-508.27300.6163.04D0.11807.300.121.400.6.151D3
     20*      *.-2.75D3.4.4D2.-7.0D2.-59.81700,-204.04D0.1375.900.-3.40753.-1.25D
     21*      *3.-9.4D2.0.0D0.0.0D0.15.1D0.-7.5D0.-355.2D0.-1.0D0.-7.5D2.5.1D2,
     22*      *0.0D0.0.0D0.1.46D0.-5.1D0.-3.3D1.1.69D2.0.0D0.0.0D0.0.0D0/
     23*       DATA A3 / 5538411.77850D.1990817.312900.369683.65300.-13451.81D0.
     24*      *10785.76D0.-2932.3D0.-1.9302.-9.5D1.3088465.7202D0.-1147021.65900.
     25*      *-62605.623D0.-66930.18D0.-22745.3D0.1.03403.4.1D2.7515.56D0/
```

00101   1*
00103   2*
00104   3*
00105   4*
00105   5*
00105   6*
00105   7*
00105   8*
00105   9*
00105   10*
00105   11*
00105   12*
00105   13*
00107   14*
00107   15*
00107   16*
00107   17*
00107   18*
00107   19*
00107   20*
00107   21*
00107   22*
00111   23*
00111   24*
00111   25*

```
...... FILLAA ******

00111   26*   *1D0,-236099.4C4D0,-173936.42D0,.511C0,.257.7D0,.5.33703,1.951D3.LLAA 026 000003
00111   27*   *  -1.602,-407.99500.44328.02400.9536.41D0,.16490,5D0.15000.900.         LLAA 027 000003
00111   28*   *-3.91703.9.001,-5.002,-591.37903,491.6000,13674.8100,-9735,700,         LLAA 028 000003
00111   29*   *-1.75303,-1.603,-1.2903,-4.C02,16.39103,-456.57D0,-390.700,-1.66103,LLAA 029 000003
00111   30*   *-2.301D3.1.3303.0.0D0,0.0D0,18.84D0,-C5.4D0,-434.5D0,6.9202,2.8D2,LLAA 030 000003
00111   31*   *.2.402.0.0D0,0.0D0,-0.12D0,-0.9D0,4.0D0,8.3D1,0.0D0,0.0D0,0.0D0,  LLAA 031 000003
00111   32*   *0.0D0/                                                            LLAA 032 000003
00113   33*   DATA   A4 / 7705697.71520O.106C359.481300,241537,0800,-31816.5200, LLAA 033 000003
00113   34*   *-1406.19D0,-495.9D0,-1.63D2,2.7D1,30.4781A.206600,-1411289.30600, LLAA 034 000003
00113   35*   *-278853.56550.16435.1600,-7243.4D0.2059.4D0.5.0D1.4930.206,LAA     LLAA 035 000003
00113   36*   *1D0,-126762.55D0,-113997.63D0,53236.0D0,16052.3D0,-3.012D3,-1.4D2,LLAA 036 000003
00113   37*   *  -1.302,-1890.32600.55302.4374A.96D0,-14512.5D0,-600.600,        LLAA 037 000003
00113   38*   *-1.75203,-1.0103.3.0D2,-393.612D0,-294.2C0.9070.32D0,-9778.2000,  LLAA 038 000003
00113   39*   *-6.057D3.2.4703.6.4D2.0.0D0,39.356D0,-719.63D0,-2005.6D0,1.63703, LLAA 039 000003
00113   40*   *3.7702.3.4D2.0.0D0.0.0C0.13.3D0,-49.9D0,-301.6D0,6.92D2,7.8D2,     LLAA 040 000003
00113   41*   *-5.5D2.0.0D0.0.0D0.-2.04D0,4.7D1,-8.3D1,0.0D0.0.0D0.0.0D0.        LLAA 041 000003
00115   42*   *0.0D0/                                                            LLAA 042 000003
00120   43*   DO 1  J=1.8                                                        LLAA 043 000003
00123   44*   DO 1  I=1.8                                                        LLAA 044 000003
00124   45*   A(1.I.J)=A1(I.J)                                                   LLAA 045 000004
00125   46*   A(2.I.J)=A2(I.J)                                                   LLAA 046 000006
00126   47*   A(3.I.J)=A3(I.J)                                                   LLAA 047 000006
00131   48* 1 A(4.I.J)=A4(I.J.                                                   LLAA 048 000010
00132   49*   RETURN                                                             LLAA 049 000013
        50*   END                                                               LLAA 050 000034
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** FILLBB ******

@FOR.S CVCOORD.FILLBB.TPFS.FILLBB
FOR S0E3-05/17/78-08:35:43 (0.)

SUBROUTINE FILLBB   ENTRY POINT 000035

STORAGE USED: CODE(1) 000045: DATA(0) 003431: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 OMI   003410

EXTERNAL REFERENCES (BLOCK, NAME)

0004 NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001 000003 122G       0001   000003 125G       0003 D 000000 B        0000 D 000000 B1      0000 D 003454 B2
0000 D 001130 B3       0000 D 001604 B4         0000 D 002260 B5       0000 D 002734 B6      0000 D 003411 .
0000 003414 INJP$      0000 I 003410 J
```

```
00117   116*     *0.1027D.45D0.-803.4D0.-7.9182D4.4.64D3.2.69D5.-1.3D4.-.6D6.0.0D0.0.LLBB  116
00117   117*     *0.0D0.0.0D0.7365.4D0.-5.76D2.-6.93D4.4.1D3.2.78D5.0.0D0.0.0D0.0.0LLBB  117
00117   118*     *D0.0.0D0.0.0D0.5278.8D0.-4.13D2.-5.9.4D4.C.0D0.0.0D0.0.0D0.0.LLBB  118
00117   119*     *0.0D0.0.0D0.0.0D0.3.783D3.-.3D3.-5.05D4.0.0D0.0.0D0.0.0D0.0.LLBB  119
00117   120*     *0.0D0.0.0D0.0.0D0.2.711D3.0.0D0.-4.22D4.0.0D0.0.0D0.0.0D0.0.LLB0  120
00117   121*     *0.0D0.0.0D0.0.0D0.1.94D3.0.0D0.0.0D0.0.0D0.0.0D0.0.0D0.0.LLBB  121
00117   122*     *0.0D0.0.0D0.1.39D3.0.0D0.0.0D0.0.0D0.0.0D0..0D0..0D0/      LLBB  122
00121   123*       DO 1 J=1.15                                              LLBB  123
00124   124*       DO 1 I=1.10                                              LLBB  124
00127   125*     B(1.I.J)=B1(I.J)                                           LLBB  125
00130   126*     B(2.I.J)=B2(I.J)                                           LLBB  126
00131   127*     B(3.I.J)=B3(I.J)                                           LLBB  127
00132   128*     B(4.I.J)=B4(I.J)                                           LLBB  128
00133   129*     B(5.I.J)=B5(I.J)                                           LLBB  129
00134   130*   1 B(6.I.J)=B6(I.J)                                           LLBB  130
00137   131*       RETURN                                                   LLBB  131
00140   132*       END                                                      LLBB  132
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ***** FLALFA *****

@FOR.S CVCOORD.FLALFA.TPF$.FLALFA
FOR S0E3-05/17/78-08:36:03 (0.)

SUBROUTINE FLALFA   ENTRY POINT 000377

STORAGE USED: CODE(1) 000406: DATA(0) 003336: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003   BLK1   003636

EXTERNAL REFERENCES (BLOCK. NAME)

0004   NERR3$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001	000002 144G	0001	000002 147G	0001	000010 155G	0001	000021 161G	0001	000031 167G
0001	000042 173G	0001	000052 201G	0001	000063 205G	0001	000073 213G	0001	000104 217G
0001	000114 225G	0001	000125 231G	0001	000135 237G	0001	000146 243G	0001	000156 251G
0001	000167 255G	0001	000177 263G	0001	000210 267G	0001	000220 275G	0001	000231 301G
0001	000241 307G	0001	000252 313G	0001	000262 321G	0001	000273 325G	0001	000303 335G
0001	000314 337G	0001	000324 345G	0001	000335 351G	0001	000345 357G	0001	000356 363G
0003 R 000000 ALPHA	0000 R 000000 ALP10	0000 R 000165 ALP11	0000 R 000352 ALP12	0000 R 000537 ALP13
0000 R 000724 ALP14	0000 R 001111 ALP15	0000 R 001276 ALP16	0000 R 001463 ALP17	0000 R 001650 ALP18
0000 R 002035 ALP19	0000 R 002222 ALP20	0000 R 002407 ALP21	0000 R 002574 ALP22	0000 R 002761 ALP23
0000 R 003146 ALP24	0000 I 003301 I	0000 I 003302 J	0000 I 003303 K	

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DATE 051778

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      SUBROUTINE FLALFA                                          FLFA  001
      COMMON /BLK1/ ALPHA(13,150)                                FLFA  002
      DIMENSION ALP10(13,9),ALP11(13,9),ALP12(13,9),ALP13(13,9),ALP14(13 FLFA  003
     *,9),ALP15(13,9),ALP16(13,9),ALP17(13,9),ALP18(13,9),ALP19(13,9),   FLFA  004
     *ALP20(13,9),ALP21(13,9),ALP22(13,9),ALP23(13,9),ALP24(13,7)        FLFA  004
C
C
C     ADD ALP-- ARRAYS FOR NEW ZONES
C
C
C     2ND SUBSCRIPT IN ALPHA( ):     1 - 9
C
      DATA ALP10 /
     *'3101','UTM','F',' ',' ',' ',' ',' ',' ',' ','ALA'                 FLFA  007
     *'BAMA','EAST Z',' ',' ','ONE ',' ',' ',' ',' '                     FLFA  008
     *'3126','UTM','WEST Z',' ','ONE ',' ',' ',' ','ALA'                 FLFA  009
     *'BAMA','UTM','EAST Z',' ','ONE ',' ',' ',' ',' '                   FLFA  010
     *'3151','UTM','F',' ',' ',' ',' ',' ','ARI'                         FLFA  011
     *'ZONA','UTM','EAST Z',' ','ONE ',' ',' ',' ',' '                   FLFA  012
     *'3176','UTM','F',' ',' ',' ','ARI','IZON'                          FLFA  013
     *'A  C','UTM','CENTRAL Z',' ','ONE ',' ',' ',' '                    FLFA  014
     *'3201','UTM','F',' ',' ',' ',' ','ARI'                             FLFA  015
     *'ZONA','UTM','WEST Z',' ','ONE ',' ',' ',' '                       FLFA  016
     *'3226','LBT','F',' ','NORTH Z',' ','ONE ','A','RKAN'               FLFA  017
     *'SAS.','LBT','NORTH Z',' ','ONE ',' ',' ','A','RKAN'               FLFA  018
     *'3251','LBT','SOUTH Z',' ','ONE ',' ','CAL'                        FLFA  019
     *'SAS.','LBT','SOUTH Z',' ','ONE ',' ',' '                          FLFA  020
     *'3276','LBT','NIA','ZON',' ','E I',' ','CALI'                      FLFA  021
     *'IFOR','LBT','IA.','ZONE',' ','II ' /                              FLFA  022
     *'3301','LBT','F',' ',' ',' ',' ','CALI'                            FLFA  023
     *'FORN','IA.','ZONE',' ',' ',' ',' '                                FLFA  024
                                                                         FLFA  025
C
C     2ND SUBSCRIPT IN ALPHA( ):     10 - 18
C
      DATA ALP11 /
     *'3326','LBT','F',' ',' ','III',' ','C','ALIF'                      FLFA  026
     *'ORNI','A. Z','ONE ',' ',' ',' ','CALI'                            FLFA  027
     *'3351','LBT','F',' ','IA.','ZONE',' ','IV '                        FLFA  028
     *'FORN','IA.','ZONE',' ',' ',' ','CAL'                              FLFA  029
     *'3376','LBT','F',' ','NIA.','ZON',' ','E V'                        FLFA  030
     *'IFOR','LBT','NIA.','ZON',' ','E V',' ','CALI'                     FLFA  031
     *'3401','LBT','F',' ','IA.','ZONE',' ',' VI'                        FLFA  032
     *'FORN','IA.','ZONE',' ',' ',' ',' ','C','ALIF'                     FLFA  033
     *'3426','LBT','F',' ','A. Z','ONE ',' ',' VII'                      FLFA  034
     *'ORNI','A. Z','ONE ',' ',' ',' ','C','ALIF'                        FLFA  035
     *'3451','LBT','F',' ','NORTH Z',' ','ONE ','C','OLOR'               FLFA  036
     *'ADO.','LBT','F',' ','IA.','ZONE',' ',' ','COL','ORAD'             FLFA  037
     *'3476','LBT','F',' ',' ',' ',' ',' '                               FLFA  038
     *'O  C','LBT','CENTRAL Z',' ','ONE ',' ','C','OLOR'                 FLFA  039
     *'3501','LBT','F',' ','SOUTH Z',' ','ONE ','C','OLOR'               FLFA  040
     *'ADO.','LBT','F',' ',' ',' ',' '                                   FLFA  041
     *'3526','LBT','F',' ',' ',' ',' ',' ','C'                           FLFA  042
     *'ONNE','CTICUT Z',' ','ONE ' /                                     FLFA  043
                                                                         FLFA  044
C
C     2ND SUBSCRIPT IN ALPHA( ):     19 - 27
C
      DATA ALP12 /                                                       FLFA  045
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FLFA   58*  *  '3551' 'UTM' 'F' ...                                   FLFA 046  000002
FLFA   59*  *     DE  'LAWA' 'RE Z' 'ONE '/                           FLFA 047  000002
FLFA   60*  *  '3576' 'LBT' 'F' ...                   'FLOR'          FLFA 048  000002
FLFA   61*  *     IDA. ' NOR' 'TH Z' 'ONE '/                          FLFA 049  000002
FLFA   62*  *  '3601' 'UTM' 'F' ...                   'FLO'           FLFA 050  000002
FLFA   63*  *     RIDA '  EA' 'ST Z' 'ONE '/                          FLFA 051  000002
FLFA   64*  *  '3626' 'UTM' 'F' ...                   'FLO'           FLFA 052  000002
FLFA   65*  *     RIDA '  WE' 'ST Z' 'ONE '/                          FLFA 053  000002
FLFA   66*  *  '3651' 'UTM' 'F' ...                   'GEO'           FLFA 054  000002
FLFA   67*  *     RGIA '  EA' 'ST Z' 'ONE '/                          FLFA 055  000002
FLFA   68*  *  '3676' 'UTM' 'F' ...                   'GEO'           FLFA 056  000002
FLFA   69*  *     RGIA '  WE' 'ST Z' 'ONE '/                          FLFA 057  000002
FLFA   70*  *  '3701' 'UTM' 'F' ...                    'I'            FLFA 058  000002
FLFA   71*  *     DAHO '  EA' 'ST Z' 'ONE '/                          FLFA 059  000002
FLFA   72*  *  '3726' 'UTM' 'F' ...                   'IDAH'          FLFA 060  000002
FLFA   73*  *     O. C ' ENTR' 'AL Z' 'ONE '/                         FLFA 061  000002
FLFA   74*  *  '3751' 'UTM' 'F' ...                    'I'            FLFA 062  000002
FLFA   75*  *     DAHO '  WE' 'ST Z' 'ONE '/                          FLFA 063  000002
FLFA   76*
FLFA   77*                 2ND SUBSCRIPT IN ALPHA(  ):   28 - 36
FLFA   78*  C
FLFA   79*  C  DATA ALP13  /                                          FLFA 064  000002
FLFA   80*  C  '3776' 'UTM' 'F' ...                   'ILLI'          NEW-EWA
FLFA   81*  *     NOIS '  EA' 'ST Z' 'ONE '/                          FL A 066  000002
FLFA   82*  *  '3801' 'UTM' 'F' ...                   'ILLI'          FLFA 067  000002
FLFA   83*  *     NOIS '  WE' 'ST Z' 'ONE '/                          FLFA 068  000002
FLFA   84*  *  '3826' 'UTM' 'F' ...                    'IND'          FLFA 069  000002
FLFA   85*  *     IANA '  EA' 'ST Z' 'ONE '/                          FLFA 070  000002
FLFA   86*  *  '3851' 'UTM' 'F' ...                    'IND'          FLFA 071  000002
FLFA   87*  *     IANA '  WE' 'ST Z' 'ONE '/                          FLFA 072  000002
FLFA   88*  *  '3876' 'LBT' 'F' ...                     'I'           FLFA 073  000002
FLFA   89*  *     IOWA. ' NOR' 'TH Z' 'ONE '/                         FLFA 074  000002
FLFA   90*  *  '3901' 'LBT' 'F' ...                     'I'           FLFA 075  000002
FLFA   91*  *     OWA. '  SOU' 'TH Z' 'ONE '/                         FLFA 076  000002
FLFA   92*  *  '3926' 'LBT' 'F' ...                    'KAN'          FLFA 077  000002
FLFA   93*  *     SAS. '  NOR' 'TH Z' 'ONE '/                         FLFA 078  000002
FLFA   94*  *  '3951' 'LBT' 'F' ...                    'KAN'          FLFA 079  000002
FLFA   95*  *     SAS. '  SOU' 'TH Z' 'ONE '/                         FLFA 080  000002
FLFA   96*  *  '3976' 'LBT' 'F' ...              K' 'ENTU'            FLFA 081  000002
FLFA   97*  *     CKY. '  NOR' 'TH Z' 'ONE '/                         FLFA 082  000002
FLFA   98*
FLFA   99*                 2ND SUBSCRIPT IN ALPHA(  ):   37 - 45
FLFA  100*  C
FLFA  101*  C  DATA ALP14  /                                          FLFA 083  000002
FLFA  102*  C  '4001' 'LBT' 'F' ...              K' 'ENTU'            FLFA 084  000002
FLFA  103*  *     CKY. '  SOU' 'TH Z' 'ONE '/                         FLFA 085  000002
FLFA  104*  *  '4026' 'LBT' 'F' ...              LO' 'UISI'           FLFA 086  000002
FLFA  105*  *     ANA. '  NOR' 'TH Z' 'ONE '/                         FLFA 087  000002
FLFA  106*  *  '4051' 'LBT' 'F' ...              LO' 'UISI'           FLFA 088  000002
FLFA  107*  *     ANA. '  SOU' 'TH Z' 'ONE '/                         FLFA 089  000002
FLFA  108*  *  '4076' 'UTM' 'F' ...                     'M'           FLFA 090  000002
FLFA  109*  *     AINE '  EA' 'ST Z' 'ONE '/                          FLFA 091  000002
FLFA  110*  *  '4101' 'UTM' 'F' ...                     'M'           FLFA 092  000002
FLFA  111*  *     AINE '  WE' 'ST Z' 'ONE '/                          FLFA 093  000002
FLFA  112*  *  '4126' 'LBT' 'F' ...                                   FLFA 094  000002
FLFA  113*  *     MA. '  RYLA' 'ND Z' 'ONE '/                         FLFA 095  000002
FLFA  114*  *  '4151' 'LBT' 'F' ...      M' 'ASSA' 'CHUS' 'ETTS'      FLFA 096  000002
FLFA  115*  *     MA. '  INLA' 'ND Z' 'ONE '/                         FLFA 097  000002
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******  FLALFA  ******

                                                                        FLFA 098  000002
                                                                        FLFA 099  000002
                                                                        FLFA 100  000002
                                                                        FLFA 101  000002

00115  116*  *    '4176','LBT','F',  ...  'MAS','SACH','USET'           FLFA 102  000002
00115  117*  *    'TS.','ISLA','ND Z','ONE ', ...                       FLFA 103  000002
00115  118*  *    '4201','UTM','F',  ...  'M:CH'                        FLFA 104  000002
00115  119*  *    'IGAN',' EA','ST Z','ONE '/                          FLFA 105  000002
00115  120*                                                             FLFA 106  000002
00115  121*  C    2ND SUBSCRIPT IN ALPHA( ):   46 - 54                  FLFA 107  000002
00115  122*  C                                                          FLFA 108  000002
00117  123*       DATA ALP15 /                                          FLFA 109  000002
00117  124*  *    '4226','UTM','F',  ...  MIC','HIGA'                    FLFA 110  000002
00117  125*  *    'N. C','ENTR','AL Z','ONE ', ...                      FLFA 111  000002
00117  126*  *    '4251','UTM','F',  ...  'MICH'                        FLFA 112  000002
00117  127*  *    'IGAN',' WE','ST Z','ONE ', ...                       FLFA 113  000002
00117  128*  *    '4276','LBT','F',  ...  MI','NNES'                     FLFA 114  000002
00117  129*  *    'OTA.',' NOR','TH Z','ONE ', ...                      FLFA 115  000002
00117  130*  *    '4301','LBT','F',  ...  'MINN','ESOT'                  FLFA 116  000002
00117  131*  *    'A. C','ENTR','AL Z','ONE ', ...                      FLFA 117  000002
00117  132*  *    '4326','LBT','F',  ...  MI','NNES'                     FLFA 118  000002
00117  133*  *    'OTA.',' SOU','TH Z','ONE ', ...                      FLFA 119  000002
00117  134*  *    '4351','UTM','F',  ...  MIS','SISS'                    FLFA 120  000002
00117  135*  *    'IPPI',' EA','ST Z','ONE ', ...
00117  136*  *    '4376','UTM','F',  ...  MIS','SISS'                    FLFA 121  000002
00117  137*  *    'IPPI',' WE','ST Z','ONE ', ...                       FLFA 122  000002
00117  138*  *    '4401','UTM','F',  ...  'MISS'                        FLFA 123  000002
00117  139*  *    'OURI',' EA','ST Z','ONE ', ...  MIS','SOUR'           FLFA 124  000002
00117  140*  *    '4426','UTM','F',  ...                                FLFA 125  000002
00117  141*  *    'I. C','ENTR','AL Z','ONE '/                          FLFA 126  000002
00117  142*                                                             FLFA 127  000002
00117  143*  C    2ND SUBSCRIPT IN ALPHA( ):   55 - 63                  FLFA 128  000002
00117  144*  C                                                          FLFA 129  000002
00121  145*       DATA ALP16 /                                          FLFA 130  000002
00121  146*  *    '4451','UTM','F',  ...  'MISS'                        FLFA 131  000002
00121  147*  *    'OURI',' WE','ST Z','ONE ', ...                       FLFA 132  000002
00121  148*  *    '4476','LBT','F',  ...  MO','NTAN'                     FLFA 133  000002
00121  149*  *    'ANA.',' NOR','TH Z','ONE ', ...                      FLFA 134  000002
00121  150*  *    '4501','LBT','F',  ...  'MONT'                        FLFA 135  000002
00121  151*  *    'A. C','ENTR','AL Z','ONE ', ...                      FLFA 136  000002
00121  152*  *    '4526','LBT','F',  ...  N','EBRA'                      FLFA 137  000002
00121  153*  *    'ANA.',' SOU','TH Z','ONE ', ...                      FLFA 138  000002
00121  154*  *    '4551','LBT','F',  ...  N','EBRA'                      FLFA 139  000002
00121  155*  *    'SKA.',' NOR','TH Z','ONE ', ...
00121  156*  *    '4576','LBT','F',  ...  NE'                           FLFA 140  000002
00121  157*  *    'SKA.',' SOU','TH Z','ONE ', ...                      FLFA 141  000002
00121  158*  *    '4601','UTM','F',  ...  N','EVAD'                      FLFA 142  000002
00121  159*  *    'VADA',' EA','ST Z','ONE ', ...                       FLFA 143  000002
00121  160*  *    '4626','UTM','F',  ...  NE'                           FLFA 144  000002
00121  161*  *    'A. C','ENTR','AL Z','ONE ', ...                      FLFA 145  000002
00121  162*  *    '4651','UTM','F',  ...                                FLFA 146  000002
00121  163*  *    'VADA',' WE','ST Z','ONE '/
00121  164*
00121  165*  C    2ND SUBSCRIPT IN ALPHA( ):   64 - 72
00121  166*  C
00123  167*       DATA ALP17 /
00123  168*  *    '4676','UTM','F',  ...  NEW'
00123  169*  *    'HAM','PSHI','RE Z','ONE ', ...
00123  170*  *    '4701','UTM','F',  ...
00123  171*  *    'NEW ','JERS','EY Z','ONE ', ...
00123  172*  *    '4726','UTM','F',  ...  NE','W ME'
00123  173*  *    'XICO',' EA','ST Z','ONE ', ...
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FLALFA ******

174*  *'4751','UTM','F',.   ',.   ',.   ',.   '  N','EW M','EXIC'
175*  *'O.C','ENTR','AL Z','ONE '
176*  *'4776','UTM','F',.   ',.   '  NE','.'W ME'
177*  *'XICO','.'WE','.'ST Z','ONE '
178*  *'4801','.'  ','F',.'ST Z','ONE '  .'NEW '
179*  *'YORK','.'EA','ST Z','ONE '
180*  *'4826','UTM','F',.'AL ','.'  NEW','.'YOR'
181*  *'K.C','ENTR','AL Z','ONE '
182*  *'4851','UTM','F',.'WE','.'ST Z','ONE '  .'NEW '
183*  *'YORK','.'WE','.'ST Z','ONE '
184*  *'4876','LBT','F',.   ',.   '  NEW','.'YOR','.'K.  L'
185*  *'ONG','ISLA','ND Z','ONE '/

      C  2ND SUBSCRIPT IN ALPHA( ):   73 - 81
      C

      DATA ALP18  /
189*  *'4901','LBT','F',.   ',.   ',.   '  N','.'NORT'
190*  *'H CA','ROLI','NA Z','ONE '
191*  *'4926','LBT','F',.'NOR','.'TH Z','ONE '  N','.'ORTH','.'DAK'
192*  *'OTA.','.'NOR','.'TH Z','ONE '
193*  *'4951','LBT','F',.'SOU','.'TH Z','ONE '  N','.'ORTH','.'DAK'
194*  *'OTA.','.'SOU','.'TH Z','ONE '
195*  *'4973','LBT','F',.'NOR','.'TH Z','ONE '            O'
196*  *'HIC.','.'NOR','.'TH Z','ONE '
197*  *'5001','LBT','F',.'NOR','.'TH Z','ONE '            O'
198*  *'HIC.','.'SOU','.'TH Z','ONE '
199*  *'5026','LBT','F',.'SOU','.'TH Z','ONE '          O','KLAH'
200*  *'OMA.','.'NOR','.'TH Z','ONE '
201*  *'5051','LBT','F',.'NOR','.'TH Z','ONE '          O','KLAH'
202*  *'OMA.','.'SOU','.'TH Z','ONE '
203*  *'5076','LBT','F',.'SOU','.'TH Z','ONE '  .'ORE'
204*  *'GON.','.'NOR','.'TH Z','ONE '
205*  *'5101','LBT','F',.'NOR','.'TH Z','ONE '  .'ORE'
206*  *'GON.','.'SOU','.'TH Z','ONE '/

      C  2ND SUBSCRIPT IN ALPHA( ):   82 - 90
      C

      DATA ALP19  /
211*  *'5126','LBT','F',.   ',.   ',.   '  P','.'ENNS','.'YLVA'
212*  *'NIA.','.'NOR','.'TH Z','ONE '
213*  *'5151','LBT','F',.'NOR','.'TH Z','ONE '  P','.'ENNS','.'YLVA'
214*  *'NIA.','.'SOU','.'TH Z','ONE '
215*  *'5176','UTM','F',.'SOU','.'TH Z','ONE '             RH'
216*  *'ODE','ISLA','ND Z','ONE '
217*  *'5201','LBT','F',.'NOR','.'TH Z','ONE '  SOU','.'TH C','.'AROL'
218*  *'INA.','.'NOR','.'TH Z','ONE '
219*  *'5226','LBT','F',.'SOU','.'TH Z','ONE '  SOU','.'TH C','.'AROL'
220*  *'INA.','.'SOU','.'TH Z','ONE '
221*  *'5251','LBT','F',.'NOR','.'TH Z','ONE '  S','.'OUTH','.'DAK'
222*  *'OTA.','.'SOU','.'TH Z','ONE '
223*  *'5276','LBT','F',.'SOU','.'TH Z','ONE '  S','.'OUTH','.'DAK'
224*  *'OTA.','.'NOR','.'TH Z','ONE '
225*  *'5301','LBT','F',.'SOU','.'TH Z','ONE '
226*  *'TEN','NESS','EE Z','ONE '
227*  *'5326','LBT','F',.'NOR','.'TH Z','ONE '            TE'
228*  *'XAS.','.'NOR','.'TH Z','ONE '/

      C  2ND SUBSCRIPT IN ALPHA( ):   91 - 99
      C
```

```
C
      DATA ALP20 /
    * '5351','LBT','F','          ','TE','XAS,','NOR'
    * '    ','    ','ENTR','AL  Z','ONE','    ',
    * '5376','LBT','F','          ','    ','TEXA'
    * 'S. C','LBT','F','ENTR','AL  Z','ONE','    ',
    * '5401','LBT','F','          ','TE','XAS,','SOU'
    * 'TH C','LBT','F','ENTR','AL  Z','ONE','    ',
    * '5426','LBT','F','          ','    ','TE'
    * 'XAS,','LBT','F','SOU','TH  Z','ONE','    ',
    * '5451','LBT','F','          ','    ','    ','U'
    * 'TAH,','LBT','F','NOR','TH  Z','ONE','    ',
    * '5476','LBT','F','ENTR','AL  Z','ONE','UTA'
    * 'H. C','LBT','F','ENTR','AL  Z','ONE','    ',
    * '5501','LBT','F','          ','    ','    ','U'
    * 'TAH,','LBT','F','SOU','TH  Z','ONE','    ',
    * '5526','UTM','F','ERRO','NT  Z','ONE','    ',
    * '    V','    ','ONE','NOR','TH  Z','ONE','/
    * 'NIA.','LBT','F','          ','    V','IRGI'
C
C     2ND SUBSCRIPT IN ALPHA( ):    100 - 108
C
      DATA ALP21 /
    * '5576','LBT','F','          ','    ','    V'
    * 'NIA.','LBT','F','SOU','TH  Z','ONE','    ',
    * '5601','LBT','F','NOR','TH  Z','ONE','WAS','HING'
    * 'TON,','LBT','F','NOR','TH  Z','ONE','    ',
    * '5626','LBT','F','SOU','TH  Z','ONE','WAS','HING'
    * 'TON,','LBT','F','SOU','TH  Z','ONE','    ',
    * '5651','LBT','F','          ','WE','ST V','IRGI'
    * 'NIA.','LBT','F','NOR','TH  Z','ONE','    ',
    * '5676','LBT','F','          ','WE','ST V','IRGI'
    * 'NIA.','LBT','F','SOU','TH  Z','ONE','    ',
    * '5701','LBT','F','NOR','TH  Z','ONE','WI','SCON'
    * 'SIN.','LBT','F','NOR','TH  Z','ONE','    ',
    * '5726','LBT','F','ENTR','AL  Z','ONE','WISC','ONSI'
    * 'N. C','LBT','F','ENTR','AL  Z','ONE','    ',
    * '5751','LBT','F','SOU','TH  Z','ONE','WI','SCON'
    * 'SIN.','UTM','F','          ','    ','    ','WY','OMIN'
    * 'G. Z','ONE','I. E','AST  /
C
C     2ND SUBSCRIPT IN ALPHA( ):    109 - 117
C
      DATA ALP22 /
    * '5801','UTM','F','          ','WYO','MING','ZO','NE I'
    * 'I. E','AST','CENT','RAL ','    ',
    * '5826','UTM','F','CENT','RAL ','WYOM','ING.','ZON','E II'
    * 'I. W','EST','F','V. W','EST','    ',
    * '5851','UTM','F','          ','WYO','MING'
    * '    ZO','NE I','    ',
    * '5876','UTM','F','ZON','E 1','H','AWAI','IAN '
    * '5901','UTM','F','NDS.','ZON','E 2','H','AWAI','IAN '
    * '5926','UTM','F','NDS.','ZON','E 3','H','AWAI','IAN '
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****** FLALFA ******

00135  290*  *'5951','UTM','F','  ','  ','  ','  ','  ','  ','H','AWAI','IAN  '
00135  291*  *,'ISLA','NDS','F','ZON','E 4',' ',' ',' ',' ',' ',' ',' '
00135  292*  *'5976','UTM','F','ZON','E 5',' ',' ',' ',' ',' ','H','AWAI','IAN  '
00135  293*  *,'ISLA','NDS','F','ZON','E 5',' ',' ',' ',' ',' ',' ',' '
00135  294*  *'6001','LBT','F','ZON','E','F','EET',' ',' ',' ',' ','PUE','RTO  '
00.35  295*  *,'RICO','ZON','E. F.','EET '/
00135  296*
00135  297*
00137  298*        C
00137  299*        C      2ND SUBSCRIPT IN ALPHA( ):  118 - 126
00137  300*        C
00137  301*        DATA ALP23 /
00137  302*  *'6026','LBT','M','  ','  ','  ','  ','  ','  ','  ','P','UERT','O RI'
00137  303*  *,'CO Z','ONE','MET','ERS',' ',' ',' ',' ',' ',' ',' ',' '
00137  304*  *'6051','LBT','F','ZON','E. F.','EET','PU','ERTO','RIC','O. S','T. C'
00137  305*  *'ROIX','ZON','E. F.','EET',' ',' ',' ',' ','PUER','TO R','ICO. ','CRO'
00137  306*  *'IX Z','ONE','MET','ERS',' ',' ',' ',' ','PUER','TO R','ICO. ','ST.'
00137  307*  *'6101','GBL','F','ZON','E 1',' ',' ',' ',' ',' ',' ',' '
00137  308*  *,'ALA','SKA','F','ZON','E 1',' ',' ',' ',' ',' ',' ',' '
00137  309*  *'6126','UTM','F','ZON','E 2',' ',' ',' ',' ',' ',' ',' '
00137  310*  *,'ALA','SKA','F','ZON','E 2',' ',' ',' ',' ',' ',' ',' '
00137  311*  *'6151','UTM','F','ZON','E 3',' ',' ',' ',' ',' ',' ',' '
00137  312*  *,'ALA','SKA','F','ZON','E 3',' ',' ',' ',' ',' ',' ',' '
00137  313*  *'6176','UTM','F','ZON','E 4',' ',' ',' ',' ',' ',' ',' '
00137  314*  *,'ALA','SKA','F','ZON','E 4',' ',' ',' ',' ',' ',' ',' '
00137  315*  *'6201','UTM','F','ZON','E 5',' ',' ',' ',' ',' ',' ',' '
00137  316*  *,'ALA','SKA','F','ZON','E 5',' ',' ',' ',' ',' ',' ',' '
00137  317*  *'6226','UTM','F','ZON','E 6',' ',' ',' ',' ',' ',' ',' '
00137  318*  *,'ALA','SKA','F','ZON','E 6 '/
00137  319*
00137  320*        C
00137  321*        C      2ND SUBSCRIPT IN ALPHA( ):  127 - 133
00137  322*        C
00141  323*        DATA ALP24 /
00141  324*  *'6251','UTM','F','ZON','E 7',' ',' ',' ',' ',' ',' ',' '
00141  325*  *,'ALA','SKA','F','ZON','E 7',' ',' ',' ',' ',' ',' ',' '
00141  326*  *'6276','UTM','F','ZON','E 8',' ',' ',' ',' ',' ',' ',' '
00141  327*  *,'ALA','UTM','F','ZON','E 8',' ',' ',' ',' ',' ',' ',' '
00141  328*  *'6301','UTM','F','ZON','E 9',' ',' ',' ',' ',' ',' ',' '
00141  329*  *,'ALA','SKA','F','ZON','E 9',' ',' ',' ',' ',' ',' ',' '
00141  330*  *'6325','LBT','F','ZONE','10',' ',' ',' ',' ',' ',' ',' '
00141  331*  *,'ALAS','KA.','F','ZONE','10',' ',' ',' ',' ',' ',' ',' '
00141  332*  *'6351','LBT','F','NOR','TH Z','ONE',' ',' ',' ',' ',' ','M','ICHI'
00141  333*  *'6376','LBT','F','ENTR','AL Z','ONE',' ',' ',' ',' ','MIC','HIGA'
00141  334*  *'N. C','LBT','F','SOU','TH Z','ONE',' ',' ',' ',' ',' ','M','ICHI'
00141  335*  *'6401','GAN.','F','SOU','TH Z','ONE'/
00141  336*
00141  337*        C
00141  338*        C      ADD DATA STATEMENTS FOR NEW ZONES
00143  339*        C
00146  340*        DO 1 I=1,9
00151  341*        DO 1 J=1,13
00154  342*     1  ALPHA(J,I)=ALP10(J,I)
00157  343*        DO 2 I=10,18
00160  344*        K=I-9
00163  345*        DO 2 J=1,13
00166  346*     2  ALPHA(J,I)=ALP11(J,K)
00171  347*        DO 3 I=19,27
             K=I-18
```

FLALFA ******

```
         DO 3 J=1,13
       3 ALPHA(J,I)=ALP12(J,K)
         DO 4 I=26,36
         K=I-27
         DO 4 J=1,13
       4 ALPHA(J,I)=ALP13(J,K)
         DO 5 I=37,45
         K=I-36
         DO 5 J=1,13
       5 ALPHA(J,I)=ALP14(J,K)
         DO 6 I=46,54
         K=I-45
         DO 6 J=1,13
       6 ALPHA(J,I)=ALP15(J,K)
         DO 7 I=55,63
         K=I-54
         DO 7 J=1,13
       7 ALPHA(J,I)=ALP16(J,K)
         DO 8 I=64,72
         K=I-63
         DO 8 J=1,13
       8 ALPHA(J,I)=ALP17(J,K)
         DO 9 I=73,81
         K=I-72
         DO 9 J=1,13
       9 ALPHA(J,I)=ALP18(J,K)
         DO 10 I=82,90
         K=I-81
         DO 10 J=1,13
      10 ALPHA(J,I)=ALP19(J,K)
         DO 11 I=91,99
         K=I-90
         DO 11 J=1,13
      11 ALPHA(J,I)=ALP20(J,K)
         DO 12 I=100,108
         K=I-99
         DO 12 J=1,13
      12 ALPHA(J,I)=ALP21(J,K)
         DO 13 I=109,117
         K=I-108
         DO 13 J=1,13
      13 ALPHA(J,I)=ALP22(J,K)
         DO 14 I=118,126
         K=I-117
         DO 14 J=1,13
      14 ALPHA(J,I)=ALP23(J,K)
         DO 15 I=127,133
         K=I-126
         DO 15 J=1,13
      15 ALPHA(J,I)=ALP24(J,K)
C
C        ADD DO LOOP FOR NEW ZONES
C
         RETURN
         END
```

END OF COMPILATION: NO DIAGNOSTICS.

●HDG.P ●●●●●● GTPLAM ●●●●●●

●FOR.S CVCOORD.GTPLAM.TPF$.GTPLAM
FOR SOE3-05/17/78-08:36:40 (0.)

SUBROUTINE GTPLAM   ENTRY POINT 000173

STORAGE USED: CODE(1) 000217: DATA(0) 000132: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

```
0003    NERR2$
0004    DTAN
0005    DCOS
0006    XPDD
0007    DSIN
0010    NERR3$
```

STORAGE ASSIGNMENT   (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```
0001  000032 1L        0001  000045 2L       0001  000060 3L        0001  000072 4L        0001  000020 AL
0000 D 000002 C        0000 D 000004 CFD     0000 D 000006 CFM      0000 D 000014 CMD      0000 D 000016 CMM
0000 D 000026 CMR      0000 D 000032 COLAT   0000 D 000010 E        0000 D 000012 EO2      0000 D 000114 INJPS
0000 D 000000 PIO2     0000 D 000040 R       0000 D 000022 RB       0000 D 000024 RK       0000 D 000030 THETA
0000 D 000034 Z1       0000 D 000036 Z2
```

```
00101   1*         SUBROUTINE GTPLAM(APHIR,ALBDR,IZONE,X,Y)           GTP  001    000000
00101   2*   C     CONVERTS GEODETIC COORDINATES TO PLANE FOR LAMBERT PROJECTION   GTP  002    000000
00101   3*   C     MICHIGAN(800 FEET ABOVE SEA-LEVEL)                 GTP  003    000000
00101   4*   C     APHIR AND ALBDR ARE RADIAN VALUES FOR LATITUDE AND LONGITUDE OF  GTP  004    000000
00101   5*   C     POINT BEING TRANSFORMED                            GTP  005    000000
00103   6*         IMPLICIT REAL*8.A-E,R-Z)                           GTP  006    000000
00104   7*         REAL*8 PIO2                                        GTP  007    000000
00104   8*   C     C IS X VALUE ALONG CENTRAL MERIDIAN                GTP  008    000000
00105   9*         ALBDR = ALBDR * 4.848136811095350-6               GTP  009    000000
00106  10*         APHIR = APHIR * 4.848136811095350-6               GTP  010    000002
00107  11*         C=2.D6                                             GTP  011    000005
00110  12*         CFD=1.7453292519943296D-2                          GTP  012    000007
00111  13*         CFM=2.9088208665721960-4                           GTP  013    000011
00111  14*   C     E IS ECCENTRICITY OF CLARK SPHEROID 1866 AT 800 FEET ABOVE SEA-  GTP  014    000011
00111  15*   C     LEVEL (FOR MICHIGAN ONLY)                          GTP  015    000011
00112  16*   CC    E=.0822718542230030D0                              GTP  016    000011
00113  17*         EO2=E/2.D0                                         GTP  017    000013
00113  18*   C     PIO2 IS RADIAN VALUE OF                            GTP  018    000015
00113  19*   C     POI2 IS RADIAN VALUE OF 90 DEGREES                 GTP  019    000015
00114  20*       5 PIO2=1.5707963267948960D0                          GTP  020    000017
00114  21*   C     IZONE DESIGNATES PROJECTION ZONE.  1=NORTH 2=CENTRAL 3=SOUTH   GTP  021    000017
```

```
00115  22*        GO TO(1,2,3),IZONE
00116  23*      1 CMD=87.0D0
00117  24*        CMM=00.0D0
00120  25*        AL=.7227899380886 DO
00121  26*        RB=20539420.095 DO
00122  27*        RK=38648850.296 DO
00123  28*        GO TO 4
00124  29*      2 CMD=84.0D0
00125  30*        CMM=20.0D0
00126  31*        AL=.7061074099527 DO
00127  32*        RB=21534768.403 DO
00130  33*        RK=34972037.039 DO
00131  34*        GO TO 4
00132  35*      3 CMD=84.0D0
00133  36*        CMM=20.0D0
00134  37*        AL=.68052206331450D0
00135  38*        RB=23069697.224 DO
00136  39*        RK=39573595.975D0
00136  40*      C CMD AND CMM ARE DEGREES AND MINUTES OF LONGITUDE OF CENTRAL
00137  41*      C MERIDIAN
00137  42*      4 CMR=CMD*CFD+CMM*CFM
00140  43*        THETA=AL*(CMR-ALOR)
00140  44*      C COLAT IS COLATITUDE IN RADIANS OF POINT BEING TRANSFORMED
00141  45*        COLAT=PIO2-APHIR
00142  46*        Z1=DTAN(COLAT/2.0D0)
00143  47*        Z2=Z1**((1.0D0+E*DCOS(COLAT))/(1.0D0-E*DCOS(COLAT)))**E02
00144  48*        R=RK*(Z2)**AL
00145  49*        X=R*DSIN(THETA)+C
00146  50*        Y=RB-R*DCOS(THETA)
00147  51*        RETURN
00150  52*        END
```

GTP column:
```
GTP 022 000021
GTP 023 000032
GTP 024 000033
GTP 025 000035
GTP 026 000037
GTP 027 000041
GTP 028 000043
GTP 029 000045
GTP 030 000046
GTP 031 000050
GTP 032 000052
GTP 033 000054
GTP 034 000056
GTP 035 000060
GTP 036 000061
GTP 037 000063
GTP 038 000065
GTP 039 000067
GTP 040 000067
GTP 041 000067
GTP 042 000072
GTP 043 000077
GTP 044 000077
GTP 045 000102
GTP 046 000105
GTP 047 000113
GTP 048 000134
GTP 049 000142
GTP 050 000150
GTP 051 000157
GTP 052 000216
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** LAMFRD ******

@FOR.S CVCOORD.LAMFRD.TPF$.LAMFRD
FOR S0E3-05/17/78-08:36:51 (0.)

SUBROUTINE LAMFRD   ENTRY POINT 000301

STORAGE USED: CODE(1) 000325; DATA(0) 000155; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150

EXTERNAL REFERENCES (BLOCK, NAME)

0004 DSIN
0005 XPDD
0006 DSQRT

```
0007    DTAN
0010    DCOS
0011    NERR3$
```

STORAGE ASSIGNMENT   (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001    000175 4L          0001    000221 5L          0003 D 000000 A          0000 D 000036 COSPHI
0000 D 000026 C1          0000 D 000030 C2          0000 D 000032 C3          0000 D 000020 E2
0000 I 000046 I          0000   000124 INJPS          0000 D 000014 K          0000 D 000024 OME2
0000 D 000012 PHA          0000 D 000040 PHA2          0000 D 000016 PHINOT          0000 D 000006 R          0000 D 000010 S
0000 D 000042 V1          0000 D 000044 V2          0000 D 000002 X          0000 D 000004 Y
```

```
1*      SUBROUTINE LAMFRD (PHO,LAO,XO,YO,IZONE)                                                        000000
2*      DOUBLE PRECISION A(150,14),ARCONE,X,Y,PHO,R,YO,S,PHA,K,XO,LAO,PHINLAMF 002                      000000
3*     *OT,E2,LA,OME2,C1,C2,C3,C4,COSPHI,PHA2                            LAMF 003                      000000
4*      DOUBLE PRECISION V1,V2                                           LAMF 004                      000000
5*      COMMON/CONST/A                                                   LAMF 005                      000000
6*      ARCONE=4.84813681D-6                                             LAMF 006                      000000
7*      I=(IZONE-3076)/25                                                LAMF 007                      000001
8*      PHINOT=((60.0D0*A(I,8))+A(I,9))                                  LAMF 008                      000005
9*      E2=6.7386577297291D-3                                            LAMF 009                      000013
10*     LA=209925832.161900                                              LAMF 010                      000015
11*     C1=101.27940065D0                                                LAMF 011                      000017
12*     C2=1052.89340820D0                                               LAMF 012                      000021
13*     OME2=1.0D0-(E2*DSIN(PHINOT*ARCONE)**2)                           LAMF 013                      000023
14*     X=LA*(1.0D0-E2)/OME2**1.5D0                                      LAMF 014                      000034
15*     Y=LA/DSQRT(OME2)                                                 LAMF 015                      000047
16*     K=(5.0D0+(3.0D0*DTAN(PHINOT*ARCONE)**2))/(120.0D0*X*Y**3)        LAMF 016                      000055
17*     COSPHI=DCOS(PHO*ARCONE)                                          LAMF 017                      000074
18*     C3=4.4334450                                                     LAMF 018                      000103
19*     C4=2.3520-2                                                      LAMF 019                      000105
20*   1 S=C1*(PHINOT-PHO+DSIN(PHO*ARCONE)*COSPHI*(C2-COSPHI**2*(C3-(C4*COS*LAMF 020                    000107
21*    *PHI**2)))                                                        LAMF 021                      000127
22*   7 IF(IZONE.NE.6326) GO TO 4                                        LAMF 022                      000127
23*     V1 = 1.0D0 / (6.0D0*X*Y)                                         LAMF 023                      000132
24*     V2 = (((5.0D0*X) - (4.0D0*Y)) * DTAN(PHINOT*ARCONE)) /           LAMF 024                      000140
25*    * (24.0D0 * (X**2) * (Y**2))                                      LAMF 025                      000140
26*     R=A(I,4)+S*A(I,6)*(1.0D0+S**2*(V1-S*V2+K*S**2))                  LAMF 026                      000155
27*     GO TO 5                                                          LAMF 027                      000173
28*   4 V1=A(I,10)*1.0D-16                                               LAMF 028                      000175
29*     V2=A(I,11)*1.0D-24                                               LAMF 029                      000201
30*     R=A(I,4)+S*A(I,6)*(1.0D0+S**2*(V1-S*V2))                         LAMF 030                      000204
31*   5 IF(LAO.LT.0.0D0) LAO=LAO+1.296D6                                 LAMF 031                      000221
32*     PHA=(A(I,7)+(A(I,3)-LAO))                                        LAMF 032                      000234
33*     XO=R*DSIN(PHA*ARCONE)+A(I,2)                                     LAMF 033                      000247
34*     PHA2=(PHA/2.0D0)*ARCONE                                          LAMF 034                      000247
35*     YO=A(I,5)+R*(2.0D0*DSIN(PHA2)**2-1.0D0)                          LAMF 035                      000253
36* 300 RETURN                                                           LAMF 036                      000264
37*     END                                                                                           000324
```

END OF COMPILATION: NO   DIAGNOSTICS.

```
00101
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```
 ......   ...
@HDG.P  ****** LAMINV ******

@FOR.S CVCOORD.LAMINV.TPF$.LAMINV
FOR S0E3-05/17/78-08:36:57 (0.)


SUBROUTINE LAMINV   ENTRY POINT 000366

STORAGE USED: CODE(1) 000414: DATA(0) 000172: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003   CONST  010150

EXTERNAL REFERENCES (BLOCK, NAME)

0004   DSIN
0005   XPDD
0006   DSQRT
0007   DTAN
0010   DATAN
0011   DCOS
0012   NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001  000313 10L      0001  000166 11L      0001  000216 12L      0001  000273 13L      0001  000312 14L
0001  000126 2L       0001  000317 5L       0003 D 000000 A       0000 D 000000 ARCONE  0000 D 000020 CHK
0000 D 000040 C5      0000 D 000042 C6      0000 D 000044 C7      0000 D 000046 C8      0000 D 000024 D
0000 D 000026 E       0000 D 000050 E2      0000 I 000056 I       0000 I 000137 INJPS   0000 D 000030 K
0000 D 000034 LA      0000 I 000057 N       0000 D 000032 OME2    0000 D 000036 PHINOT  0000 D 000004 PHO
0000 D 000006 R       0000 D 000002 RBYB    0000 D 000012 SA      0000 D 000014 SAN     0000 D 000004 PHO
0000 D 000052 V1      0000 D 000054 V2      0000 D 000022 W       0000 D 000010 YI      0000 D 000016 SRV

00101   1*     SUBROUTINE LAMINV (X,Y,PHI,LAM,IZONE)
00103   2*     DOUBLE PRECISION A(150,14),ARCONE,X,Y,RBYB,PHO,LAM,R,YI,SA,SAN,SRV   000000
00103   3*    *,CHK,W,PHI,D,E,K,OME2,LA,PHINOT                                      000000
00104   4*     DOUBLE PRECISION C5,C6,C7,C8,E2                                      000000
00105   5*     DOUBLE PRECISION V1,V2                                              000000
00106   6*     COMMON/CONST/A                                                      000000
00107   7*     ARCONE=4.848136811D-6                                              000000
00110   8*     I=(IZONE-3076)/25                                                   000001
00111   9*     RBYB=(A(I,4))-Y                                                     000001
00112  10*     C5=.987367555330-2                                                  000012
00113  11*     C6=1047.545710D0                                                    000013
00114  12*     C7=6.192760D0                                                       000014
00115  13*     C8=.050912D0                                                        000014
00116  14*     LA=20925832.161900                                                 000022
00117  15*     PHINOT=((60.0D0*A(I,8))+A(I,9))                                     000027
00120  16*     E2=6.768657997291D-3                                               000031
00121  17*     OME2=1.0D0-(E2*DSIN(PHINOT*ARCONE)**2)                              000032
```

```
00122   18*          D=LA*(1.0D0-E2)/CME2**1.5D0
00123   19*          E=LA/DSQRT(CME2)
00124   20*          K=(5.0D0+(3.0D0*DTAN(PHINOT*ARCONE)**2))/(120.0D0*D*E**3)
00125   21*        1 PHO=DATAN((X-A(I,2))/(A(I,5)-Y))
00126   22*          PHO=PHO*ARCONE
00127   23*          LAM=A(I,3)-(PHO/A(I,7))
00127   24*          IF(LAM.GT.6.4805) GO TO 10
00132   25*        2 PHO=PHO*ARCONE
00133   26*          R=((A(I,5)-Y)*DCOS(PHO))
00134   27*          YI=(Y-2.0D0*(R)*(DSIN(PHO/2.0D0)**2))
00136   28*          N=0
00137   29*          SA=(A(I,12)-YI)*A(I,13)
00140   30*          SAN=SA
00140   31*       11 CONTINUE
00141   32*          IF(ICO.E.EQ.6326) GO TO 12
00143   33*          V1=A(I,10)*1.0D-16
00144   34*          V2=A(I,11)*1.0D-24
00145   35*          SRV=SA/(1.0D0+V1*SAN**2-V2*SAN**3)
00146   36*          GO TO 13
00147   37*       12 V1 = 1.0D0 / (6.0D0*D*E)
00150   38*          V2 = (((5.0D0*D) - (4.0D0*E)) * DTAN(PHINOT*ARCONE)) /
00150   39*        *    (24.0D0 * (D**2) * (E**2))
00151   40*          SRV=SA/(1.0D0+V1*SAN**2-V2*SAN**3+K*SAN**4)
00152   41*       13 N=N+1
00152   42*          CHK=DABS(SAN-SRV)
00153   43*          IF(CHK.LE..C05) GO TO 14
00156   44*          IF(N.EQ.10) GO TO 14
00160   45*          SAN=SRV
00161   46*          GO TO 11
00162   47*       14 CONTINUE
00163   48*          GO TO 5
00164   49*       10 LAM=LAM-1.296D6
00165   50*          GO TO 2
00166   51*        5 W=PHINOT-(C5*SRV)
00167   52*          PHI=W*DSIN(X*ARCONE)*DCOS(W*ARCONE)*(C6+DCOS(W*ARCONE)*(C7+C8*DLAM
00167   53*        *COS(W*ARCONE)**2))
00170   54*      300 RETURN
00171   55*          END

END OF COMPILATION:        NO   DIAGNOSTICS.
```

```
0003   DSIN
000?   D?OC
0005   DCOS
0006   XPDD
0007   DATAN
0010   NERR3$
```

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION, NAME)

```
0000 D 000016 AKCB     0000 D 000020 ARCONE    0000 D 000010 B       0000 D 000030 BL      0000 D 000012 C
0000 D 000024 CALFO    0000 D 000002 COSH      0000 D 000006 E       0000 D 000050 EA      0000 D 000040 EB
0000 D 000112 INJP$    0000 D 000014 LAMO      0000 D 000034 MU      0000 D 000026 SALFO   0000 D 000000 SINH
0000 D 000022 SINPHI   0000 D 000042 TANB      0000 D 000004 TANH    0000 D 000044 U       0000 D 000046 V
0000 D 000032 VA       0000 D 000036 VB
```

```
00101    1*    SUBROUTINE OBMEK(PHI,LAM,X,Y)                                          OBM   001   000000
00103    2*    DOUBLE PRECISION E.B.C.LAMO.AKCB.ARCONE.SINPHI.CALFO.SALFO.BL.VA.       OBM   002   000000
00103    3*   *MU.VB.EB.COSH.SINH.TANB.U.TANH.V.EA.PHI.LAM.X.Y                         OBM   003   000000
00104    4*    E=.08227195420D0                                                       OBM   004   000000
00105    5*    B=1.60029977270D0                                                      OBM   005   000000
00106    6*    C=4.47509131D-3                                                        OBM   006   000000
00107    7*    LAMO=345450.5132D0                                                     OBM   007   000005
00110    8*    EA=2.71829132800                                                       OBM   008   000007
00111    9*    AKCB=635352.670D0                                                      OBM   009   000011
00112   10*    ARCONE=4.849136811D-6                                                  OBM   010   000013
00113   11*    SINPHI=DSIN(PHI*ARCONE)                                                OBM   011   000015
00114   12*    CALFO=0.945019966900                                                   OBM   012   000023
00115   13*    SALFO=-0.327015172D0                                                   OBM   013   000025
00116   14*    BL=B*(LAM-LAMO)                                                        OBM   014   000027
00117   15*    VA=(1.6205+(PHI/2.0D0))*ARCONE                                         OBM   015   000031
00120   16*    VB=E*SINPHI                                                            OBM   016   000040
00121   17*    MU=DLOG(DSIN(VA)/DCOS(VA))-((E/2.0D0)*DLOG((1.0D0+VB)/(1.0D0-VB)))      OBM   017   000042
00122   18*    EB=EA-*(B*MU+C)                                                        OBM   018   000073
00123   19*    COSH=(EB+(1.0D0/EB))/2.000                                             OBM   019   000102
00124   20*    SINH=(EB-(1.0D0/EB))/2.0D0                                             OBM   020   000112
00125   21*    TANB=((CALFO*SINH)-(SALFO*DSIN(BL*ARCONE)))/DCOS(BL*ARCONE)            OBM   021   000117
00126   22*    U=AKCB*(((1.6205*ARCONE)+DATAN((TANB-1.0D0)/(TANB+1.0D0)))             OBM   022   000141
00127   23*    TANH=((-CALFO*DSIN(BL*ARCONE))-(SALFO*SINH))/COSH                      OBM   023   000156
00130   24*    V=AKCB*0.500*DLOG((1.0D0+TANH)/(1.0D0-TANH))                           OBM   024   000174
00131   25*    X=(-0.6D0*U)+(0.8D0*V)+5.0D6                                           OBM   025   000202
00132   26*    Y=(0.8D0*U)+(0.6D0*V)-5.0D6                                            OBM   026   000207
00133   27*    X=X*3.28083333300                                                      OBM   027   000216
00134   28*    Y=Y*3.28083333300                                                      OBM   028   000221
00135   29*    RETURN                                                                 OBM   029   000222
00136   30*    END                                                                    OBM   030   000257
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** OBMINV ******

@FOR.S CVCOORD.OBMINV,TPF$.OBMINV

FOR SOE3-05/17/78-08:37:25 (0.)

SUBROUTINE OBMINV   ENTRY POINT 000305

STORAGE USED: CODE(1) 000333: DATA(0) 000174: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003   XPDD
0004   DSIN
0005   DLOG
0006   DATAN
0007   DCOS
0010   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0000  D  000042  ARCONE      0000  D  000032  B        0000  D  000016  BAKC      0000  D  000036  BM        0000  D  000072  BU
0000  D  000020  BV          0000  D  000026  C        0000  D  000012  CALFO     0000  D  000002  COSH      0000  D  000070  COSZ
0000  D  000054  CO          0000  D  000056  C1       0000  D  000063  C2        0000  D  000062  C3        0000  D  000064  C4
0000  D  000030  E           0000  D  000022  EBV      0000  D  000024  E2B       0000  D  000034  E2BM      0000  D  000150  IMOPS
0000  D  000044  LAMO        0000  D  000040  MU       0000  D  000014  SALFO     0000  D  000000  SINH      0000  D  000046  SINZ
0000  D  000066  TANBL       0000  D  000004  TANH     0000  D  000050  TANZ      0000  D  000006  U         0000  D  000010  V
0000  D  000052  Z
```

```
00101    1*       SUBROUTINE OBMINV(X,Y,PHI,LAM)
00101    2*    C  OBLIQUE MERCATOR INVERSE
00103    3*       DOUBLE PRECISION  X,Y,PHI,LAM,U,V,CALFO,SALFO,BAKC,BV,EBV,SINH,
00103    4*      *COSH,TANH,E2B,C,E,B,E2BM,BM,MU,ARCONE,LAMO,SINZ,TANZ,Z,CO,C1,C2.
00103    5*      *C3,C4,TANBL,COSZ,         BU
00104    6*       X=X/3.2808333333300
00105    7*       Y=Y/3.2808333333300
00106    8*       U=(-0.6D0-X)+(0.6D0-Y)+7.0D6
00107    9*       V=(0.6D0-X)+(0.6D0-Y))-1.0D6
00110   10*       CALFO=0.9450189459900
00111   11*       SALFO=-0.3270155172D0
00112   12*       BAKC=1.0D0/6386352.670D0
00113   13*       ARCONE=4.912136811D-5
00114   14*       LAMO=345450.513200
00115   15*       E=2.7182818280D0
00116   16*       BU=U*BAKC
00117   17*       BV=V*BAKC
00120   18*       EBV=E**(BV)
00121   19*       SINH=(EBV-(1.0D0/EBV))/2.0D0
00122   20*       COSH=(EBV+(1.0D0/EBV))/2.0D0
00123   21*       TANH=((CALFO*DSIN(BU))-(SALFO*SINH))/COSH
00124   22*       E2B= (1.0D0+TANH)/(1.0D0-TANH)
00125   23*       C=4.475991310-3
00126   24*       B=1.0002997727D0
00127   25*       E2BM=E2B/(E-*(2.0D0*(B+C)))
00130   26*       BM=0.5D0*DLOG(E2BM)
```

```
DBMI  001
DBMI  002
DBMI  003
DBMI  004
DBMI  005
DBMI  006
DBMI  007
DBMI  008
DBMI  009
DBMI  010
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DBMI  023
DBMI  024
DBMI  025
DBMI  026
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000074
000101
000103
000105
000117
```

```
00131   27*      MU=(BM*B)+1.0D0
00132   28*      SINZ=( E**(2.0D0*MU)-1.0D0)/(E**(2.0D0*MU)+1.0D0)
00133   29*      COSZ =  (2.0D0-(E**MU))/((E**(MU*2.0D0))+1.0D0)
00134   30*      TANZ=SINZ/COSZ
00135   31*      Z=(1.62D5-ARCCNE)+DATAN((TANZ-1.0D0)/(TANZ+1.0D0))
00136   32*      CO=6.91473435D-3
00137   33*      C1=-5.133975D-5
00140   34*      C2=5.94080-7
00141   35*      C3=-7.40D-9
00142   36*      C4=9.0D-11
00143   37*      PHI=Z+(SINZ*COSZ*(CO+(C1*SINZ**2    )+(C2*SINZ**4    )+
00144   38*     *(C3*SINZ**6    )+(C4*SINZ**8    )))
00145   39*      PHI=PHI/ARCONE
00146   40*      TANBL=((-CALFO*SINH)-(SALFO*DSIN(BU)))/DCCS(BU)
00147   41*      LAM=LAMO+((1.0D0/B)**(1.62D5-(DATAN((1.0D0-TANBL)/(1.0D0+TANBL))
00150   42*     */ARCCNE)))
        43*      RETURN
        44*      END
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ***** PTGLAM *****

@FOR.S CVCOORD.PTGLAM,TPF$.PTGLAM
FOR S E3-05/17/78-08:37:45 (0.)

SUBROUTINE PTGLAM   ENTRY POINT 000212

STORAGE USED: CODE(1) 000233; DATA(0) 000136; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003  NERR2$
0004  DATAN
0005  DCOS
0006  XPDD
0007  NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000017 1L     0001   000034 2L     0001   000051 3L     0001   000065 4L     0001   000123 5L
0001   000173 6L     0000 D 000010 AL     0000 D 000014 CMD    0000 D 000016 CMM    0000 D 000000 E
0000 D 000004 EKS    0000 D 000002 EO2    0000 D 000114 INJP$  0000 D 000020 P      0000 D 000026 Q
0000 D 000024 R      0000 D 000006 RB     0000 D 000012 RK     0000 D 000022 THETA
```

```
00101   1*      SUBROUTINE PTGLAM(X,Y,IZONE,APHIR,ALBDR)                          PTG  001  000000
00101   2*   C     PROGRAM =A339        M.V. THOMPSON  MARCH,1969                  PTG  002  000000
00101   3*   C     PLANE TO GEODETIC. MICHIGAN, LAMBERT (SUBROUTINE PTGLAM)        PTG  003  000000
```

```
....... PROGRAM ......                                                    DATE 051778

00101          C        THIS SUBROUTINE CONVERTS THE X AND Y COORDINATES FOR MICHIGAN   PTG 004 000000
00101    4*    C        (LAMBERT PROJECTION) INTO LATITUDE AND LONGITUDE (SECONDS)       PTG 005 000000
00101    5*    C        IZONE IS ZONE CODE    1=NORTH  2=CENTRAL  3=SOUTH                PTG 006 000000
00101    6*    C        APHIR AND ALBDR ARE OUTPUT LATITUDE AND LONGITUDE, RESPECTIVELY. PTG 007 000000
00101    7*    C        IN SECONDS                                                       PTG 008 000000
00101    8*             IMPLICIT REAL*8(A-H,O-Z)                                         PTG 009 000000
00103    9*             E=.0822718542230037D0                                            PTG 010 000000
00104   10*             EO2=E/2.0D0                                                      PTG 011 000001
00105   11*             EKS=X-2000000.00D0                                               PTG 012 000003
00106   12*             GO TO(1,2,3),IZONE                                               PTG 013 000005
00107   13*           1 RB=205399420.095D0                                               PTG 014 000017
00110   14*             AL=.7227829380895560D0                                           PTG 015 000020
00111   15*             RK=3961381450.296D0                                              PTG 016 000022
00113   16*             CMD=87.0CD0                                                       PTG 017 000024
00114   17*             CMM=00.00D0                                                       PTG 018 000026
00115   18*             P=0.8078D0                                                       PTG 019 000030
00116   19*             GO TO 4                                                          PTG 020 000032
00117   20*           2 RB=215947768.403D0                                               PTG 021 000034
00120   21*             AL=.7064074099527100                                             PTG 022 000035
00121   22*             RK=3897220037.039D0                                              PTG 023 000037
00122   23*             CMD=84.0D0                                                       PTG 024 000041
00123   24*             CMM=00.000                                                       PTG 025 000043
00124   25*             P=0.784400                                                       PTG 026 000045
00125   26*             GO TO 4                                                          PTG 027 000047
00126   27*           3 RB=230509597.224D0                                               PTG 028 000051
00127   28*             AL=.6805292633144900                                             PTG 029 000052
00130   29*             RK=3955735595.975D0                                              PTG 030 000054
00131   30*             CMD=84.0                                                         PTG 031 000056
00132   31*             CMM=20.0                                                         PTG 032 000060
00133   32*             P=0.746500                                                       PTG 033 000062
00134   33*           4 THETA=DATAN(EKS/(RB-Y))                                          PTG 034 000065
00135   34*             R=(RB-Y)/DCOS(THETA)                                             PTG 035 000076
00136   35*             CMD=(CMD*1.74532925199433D-2)+(CMM*2.9088820866572220-4)         PTG 036 000104
00137   36*             ALBDR=CMD-THETA/AL                                               PTG 037 000112
00140   37*             ALBDR=ALBDR*2.0626480624709630D5                                 PTG 038 000117
00141   38*           5 Q=2.0D0*DATAN((R/RK)**(1.0D0,AL)-E*DCOS(P))/(1.0D0+E*DCOS(       PTG 039 000123
00142   39*             XP)))**EO2)                                                      PTG 040 000123
00142   40*             IF(DABS(P-Q).LE.(5.0D-10))GO TO 6                                PTG 041 000162
00144   41*             P=Q                                                              PTG 042 000167
00145   42*             GO TO 5                                                          PTG 043 000171
00146   43*           6 APHIR=1.5707963267949000D0-Q                                     PTG 044 000173
00147   44*             APHIR=APHIR*2.0626480624709630D5                                 PTG 045 000175
00150   45*             RETURN                                                           PTG 046 000177
00151   46*             END                                                             PTG 047 000232
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** STOD ******

@FOR.S CVCOORD.STOD,TPFS.STOD
FOR S0E3-05/17/78-08:37:57 (0.)

SUBROUTINE STOD   ENTRY POINT 000070

STORAGE USED: CODE(1) 000111; DATA(0) 000025; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003   NERR3$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION, NAME)

0001   000060 10L   0000 I 000000 IDGA   0000   000014 INJP$

```
00101      1*        SUBROUTINE STOD(SECI,IDG,MN,SECO)
00103      2*        DOUBLE PRECISION SECI,SECO
00104      3*        IDG=SECI/3600.0D0
00105      4*        IDGA=IABS(IDG)
00106      5*        MN=(DABS(SECI)-FLOAT(IDGA)*3600.0)/60.0
00107      6*        SECO=DABS(SECI)-FLOAT(IDGA)*3600.0 -(FLOAT(MN)*60.0)
00110      7*        IF (SECO-59.9995) 10,10,6
00113      8*      6 SECO=0.0
00114      9*        MN=MN+1
00115     10*        IF (MN-60) 10,8,8
00120     11*      8 MN=0
00121     12*        IDG=IDG+1
00122     13*     10 RETURN
00123     14*        END
```

STOD 001   000000

STOD 003   000000
STOD 004   000000
STOD 005   000010
STOD 006   000027
STOD 007   000041
STOD 008   000044
STOD 009   000046
STOD 010   000050
STOD 011   000053
STOD 012   000051
STOD 013   000050
STOD 014   000110

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** TMCOF ******

@FOR.S CVCOORD.TMCOF,TPF$.TMCOF
FOR S0E3-05/17/78-08:38:16 (0.)

SUBROUTINE TMCOF   ENTRY POINT 000143

STORAGE USED: CODE(1) 00015u; DATA(0) 000070: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003   NERR3$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION, NAME)

0000 D 000000 FAC   0000   000062 INJP$

```
00101        1*      SUBROUTINE TMCOF(A)                                          TMCOF   1    000000
00101        2*    C SETS UP COEFFICIENTS FOR CONVERTING GEODETIC TO RECTIFYING LATITUDE  TMCOF  2    000000
00101        3*    C AND CONVERSELY                                               TMCOF   3    000000
00103        4*      DOUBLE PRECISION A(16),FAC                                    TMCOF   4    000000
00104        5*    6 A(10)=((A(16)*(7.0D0/3.2D1)+(5.0D0/1.6D1))*A(16)+0.5D0)*A(16) TMCOF   5    000000
00104        6*      *+1.0D0)*A(16)*0.25D0                                         TMCOF   6    000090
00105        7*      A(1)=-((A(10)*(1.95D2/6.4D1)*A(10)+3.25D0)*A(10)+3.75D0)*A(10)+3.0D0)*  TMCOF  7    000012
00105        8*      *A(10)                                                        TMCOF   8    000012
00106        9*      A(2)=((1.45503/3.2D1)*A(10)+(7.0D1/3.0D0))*A(10)+7.5D0)*A(10)**2  TMCOF  9   000023
00107       10*      A(3)=-((7.0D1/3.0D0)*A(10)*(9.45D2/8.0D0))*A(10)**3           TMCOF10    000034
00110       11*      A(4)=(3.15D2/4.0D0)*A(10))**4                                 TMCOF11    000045
00111       12*      A(11)=((7.75D0-(6.57D2/6.4D1)*A(10))*A(10)-5.25D0)*A(10)+3.0D0)*  TMCOF12   000052
00111       13*      *A(10)                                                        TMCOF13    000052
00112       14*      A(12)=((5.04503/3.2D1)*A(10)-(1.51D2/3.0D0))*A(10)+10.5D0)*   TMCOF14    000061
00112       15*      *A(10)**2                                                     TMCOF15    000064
00113       16*      A(13)=((1.51D2/3.0D0)-(3.291D3/8.0D0)*A(10))*A(10)**3         TMCOF16    000075
00114       17*      A(14)=(1.097D3/4.0D0)*A(10))**4                               TMCOF17    000105
00114       18*    C A(1) TO A(4) ARE FOR GEODETIC TO RECTIFYING LATITUDE          TMCOF18    000106
00114       19*    C     CONVERSION WHILE A(11) TO A(14) ARE COEFFICIENTS FOR      TMCOF19    000106
00114       20*    C     RECTIFYING TO GEODETIC CONVERSION.                        TMCOF20    000106
00115       21*      FAC=A(10)+A(10)                                              TMCOF21    000113
00116       22*      A(10)=((2.25D2/6.4D1)*FAC+2.25D0)*FAC+1.0D0)*(1.0D0-FAC)*     TMCOF22    000116
00116       23*      *(1.0D0-A(10))*A(15)                                          TMCOF23    000116
00116       24*    C A(10) IS NOW SET TO RADIUS OF SPHERE WITH GREAT CIRCLE LENGTH TMCOF24    000116
00116       25*    C     EQUAL TO SPHEROID MERIDIAN LENGTH.                        TMCOF25    000116
00117       26*      RETURN                                                        TMCOF26    000133
00120       27*      END                                                          TMCOF27-   000147
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** TMFWD ******

@FOR.S CVCORD.TMFWD.TPF$.TMFWD
FOR S0E3-05/17/78-08:38:36 (0.)

SUBROUTINE TMFWD   ENTRY POINT 000371

STORAGE USED: CODE(1) 000417; DATA(0) 000167; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003    DSIN
0004    DCOS
0005    DSQRT
0006    NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001 000345 8000L    0001    0001  000350 8020L   0001  000353 9000L  0000 D 000000 E    0000 D 000034 COSP
0000 D 000030 ETAS   0000    0000  000150 INUPS         000036 RN     0000 D 000032 SINP  0000 D 000040 T
```

0000 D 000042 TS

```
      SUBROUTINE TMFWD (SLAT,SLON,NORTH,EAST,A,SK,THET,JERR)
C
C     THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
C
C        GEOGRAPHIC TO UTM COORDINATES
C
C        A(1) - A(4)      -- COEFFICIENTS TO CONVERT GEODETIC LAT. TO
C                                           RECTIFYING LAT.
C        A(5)             -- FALSE EASTING
C        A(6)             -- FALSE NORTHING
C        A(8)             -- SCALE FACTOR AT CENTRAL MERIDIAN
C        A(9)             -- CENTRAL MERIDIAN IN SEC.
C        A(10)            -- RADIUS OF SPHERE HAVING GREAT CIRCLE LENGTH
C                                        = SPHEROID MERIDIAN LENGTH
C        A(11) TO A(14)   -- COEFFICIENTS TO CONVERT RECTIFYING LAT. TO
C                                           GEODETIC LAT.
C        A(15)            -- SEMIMAJOR AXIS OF SPHEROID
C        A(16)            -- ECCENTRICITY**2
C
      DOUBLE PRECISION A(16),B(12),SLAT,SLON,NORTH,EAST,SK,THET,
     *     ETAS,SINP,COSP,RN,T,TS
C
C
      JERR=0
C
      IF (DABS(SLAT).GT.302400.0D0)
     *                         GOTO 8000
    8 B(10)=(A(9)-SLON) *4.848136811095360-6
      IF (DABS(B(10)).GT.0.16D0)
     *                         GOTO 8020
   10 B(9)=SLAT*4.848136811095360-6
      SINP=DSIN(B(9))
      COSP=DCOS(B(9))
      RN=A(15)/DSQRT(1.0D0-A(16)*SINP*SINP)
      T=SINP/COSP
      TS=T*T
      B(11)=COSP*COSP
      ETAS=A(16)*B(11)/(1.0D0-A(16))
      B(1)=RN*COSP
      B(3)=(1.0D0-TS+ETAS)*B(1)*B(11)/6.0D0
      B(5)=((TS-18.0D0)*TS+5.0D0+(14.0D0-58.0D0*TS)*ETAS)*B(1)*B(11)*
     *     B(11)/120.0D0
      B(7)=(((179.0D0-TS)*TS-479.0D0)*TS+61.0D0)*B(1)*B(11)**3/5040.0D0
      B(12)=B(10)*B(10)
      EAST=(((B(7)*B(12)+B(5))*B(12)+B(3))*B(12)+B(1))*B(10)*A(8)+
     X A(5)
      B(2)=RN*B(11)*T/2.0D0
```

```
00131  54*       B(4)=(ETAS*(9.0D0+4.0D0*ETAS)+5.0D0-TS)*B(2)*B(11)/12.0D0                TMFWD40  000147
00132  55*       C(5)-(.TS-55.0D0+TS-61.0D0+(270.0D0-330.0D0*TS)*ETAS)*B(2)*              TMFWD41  000152
00133  56*      *  B(11)*B(11)/360.0D0                                                    TMFWD42  000162
00133  57*       B(8)=((543.0D0-TS)*TS-3111.0D0)*TS+1385.0D0)*B(2)*B(11)**3/              TMFWD43  000201
00133  58*      *  20160.0D0                                                              TMFWD44  000201
00134  59*       NORTH=(((B(8)*B(12)+B(6))*B(12)+B(4))*B(12)+B(2))*B(12)+                 TMFWD45  000216
00134  60*      *  ((((A(4)*B(11)+A(3))*B(11)+A(2))*B(11)+A(1))*SINP*COSP+B(9))           TMFWD46  000216
00134  61*      *  *A(10)                                                                 TMFWD47  000216
00135  62*       NORTH=(NORTH-A(7))*A(8)+A(6)                                             TMFWD48  000212
00135  63* C                                                                             TMFWD49  000212
00135  64* C           COMPUTE SCALE FACTOR (SK)                                                  000242
00136  65* C                                                                             TMFWD51  000212
00136  66*       SK=((((-24.0D0*ETAS-48.0D0)*ETAS-28.0D0)*ETAS-4.0D0)*TS)+                TMFWD52  000246
00136  67*      X(((4.0D0*ETAS+13.0D0)*ETAS+14.0D0)*ETAS+5.0D0)*((B(10)**4)/24.0D0TMFWD53  000235
00137  68*      X)*B(11)*B(11)+(1.0D0+ETAS)*B(11)*(B(10))/2.0D0+1.0D0                     TMFWD54  000246
00137  69*       SK=SK*A(8)                                                               TMFWD55  000306
00137  70* C                                                                                     000306
00137  71* C           COMPUTE CONVERGENCE ANGLE (THET)                                  TMFWD57  000306
00140  72* C                                                                                     000310
00140  73*       THET=(B(10)*SINP*(1.0D0+((B(10)**2)*B(11)/3.0D0)*(1.0D0+3.0D0           TMFWD58  000310
00140  74*      X*ETAS+2.0D0*ETAS**2)+(B(10)**4)*((B(11)**2)/15.0D0)*(2.0D0-TS)))*        TMFWD59  000310
00141  75*      X206264.806247096400                                                     TMFWD60  000341
00141  76*    99 RETURN                                                                  TMFWD61  000341
00141  77* C                                                                                     000341
00141  78* C                                                                                     000341
00141  79* C           SET ERROR CODES                                                           000341
00141  80* C                                                                                     000341
00141  81* C                                                                                     000341
00141  82* C           LATITUDE > 84 DEG.                                                        000341
00141  83* C                                                                                     000341
00142  84*  8000 JERR=15                                                                         000345
00143  85*       GOTO 9000                                                                       000345
00143  86* C                                                                                     000346
00143  87* C           LONGITUDE > 0.16 RAD.                                                     000346
00143  88* C                                                                                     000346
00144  89*  8020 JERR=16                                                                         000351
00145  90*       GOTO 9000                                                                       000351
00145  91* C                                                                                     000351
00146  92*  9000 EAST=0.0D0                                                                      000353
00147  93*       NORTH=0.0D0                                                                     000354
00147  94* C                                                                                     000354
00147  95* C                                                                                     000355
00150  96*  9999 RETURN                                                                          000355
00151  97*       END                                                                    TMFWD62- 000416
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ****** TMINV ******

@FOR.S CVCOORD.TMINV.TPF$.TMINV
FOR S0E3-05/17/78-08:39:01 (0.)

SUBROUTINE TMINV   ENTRY POINT 000517

STORAGE USED: CODE(1) 000550; DATA(0) 000217; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
0003   DSIN
0004   DCOS
0005   DSQRT
0006   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000472 8000L    0001   000475 8020L    0001   000500 9000L    0001   000503 9999L
0000 D 000044 BN       0000 D 000046 BNS      0000 D 000034 COSW     0000 D 000030 ETAS    0000 D 000000 B
0000 D 000036 RN       0000 D 000032 SINW     0000 D 000040 T        0000 D 000042 TS      0000   C00176 INUPS
0000 D 000052 Y                                                                            0000 D 000050 X
```

```
      1*          SUBROUTINE TMINV (NORTH,EAST,SLAT,SLON,A,SK,THET,JERR)
      2*   C
      3*   C
      4*   C      THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
      5*   C
      6*   C      UTM TO GEOGRAPHIC COORDINATES
      7*   C
      8*   C
      9*   C
     10*   C      A(1) - A(4)    -- COEFFICIENTS TO CONVERT GEODETIC LAT. TO
     11*   C                        RECTIFYING LAT.
     12*   C      A(5)           -- FALSE EASTING
     13*   C      A(6)           -- FALSE NORTHING
     14*   C      A(8)           -- SCALE FACTOR AT CENTRAL MERIDIAN
     15*   C      A(9)           -- CENTRAL MERIDIAN IN SEC.
     16*   C      A(10)          -- RADIUS OF SPHERE HAVING GREAT CIRCLE LENGTH
     17*   C                        = SPHEROID MERIDIAN LENGTH
     18*   C      A(11) TO A(14) -- COEFFICIENTS TO CONVERT RECTIFYING LAT. TO
     19*   C                        GEODETIC LAT.
     20*   C      A(15)          -- SEMIMAJOR AXIS OF SPHEROID
     21*   C      A(16)          -- ECCENTRICITY**2
     22*   C
     23*   C
     24*   C
     25*          DOUBLE PRECISION A(16),B(12),SLAT,SLON,NORTH,EAST,SK,THET.
     26*         * ETAS,SINW,COSW,RN,T,TS,BN,BNS,X,Y
     27*   C
     28*   C
     29*   C
     30*          JERR=0
     31*   C
     32*          Y=NORTH
     33*          X=EAST
     34*          B(9)=((A(5)-X)*1.0D-6)/A(8)                          TMINV11
     35*          IF (DABS(B(9)).GT.1.0D-7*A(15)*2.0D0)                TMINV12
     36*         *          GOTO 8000                                  TMINV14
     37*        8 B(10)=((Y-A(6))/A(8)+A(7))/A(10)                     TMINV20
```

```
          IF (DABS(B(10)).GT.1.47D0)                                        TMINV22   000026
                                      GOTO 8020                             TMINV23   000026
       10 SINW=DSIN(B(10))                                                  TMINV24   000032
          COSW=DCOS(B(10))                                                  TMINV25   000032
          B(12)=COSW*COSW                                                   TMINV26   000042
          B(11)=(((A(14)*B(12)+A(13))*B(12)+A(12))*B(12)+A(11))*SINW*COSW   TMINV27   000044
         *+B(10)                                                           TMINV28   000056
          SINW=DSIN(B(11))                                                  TMINV29   000062
          COSW=DCOS(B(11))                                                  TMINV30   000065
          RN=DSQRT(1.0D0-A(16)*SINW*SINW)*1.0D6/A(15)                       TMINV31   000102
          T=SINW/COSW                                                       TMINV32   000105
          TS=T*T                                                            TMINV33   000107
          B(12)=COSW*COSW                                                   TMINV34   000112
          ETAS=A(16)*B(12)/(1.0D0-A(16))                                    TMINV35   000117
          B(1)=RN/COSW                                                      TMINV36   000121
          B(2)=-T*(1.0D0+ETAS)*RN*RN/2.0D0                                  TMINV37   000130
          B(3)=(1.0D0+2.0D0*TS+ETAS)*B(1)*RN*RN/6.0D0                       TMINV38   000141
          B(4)=((-6.0D0-ETAS*9.0D0)*ETAS+3.0D0)*TS+(6.0D0-ETAS*3.0D0)*ETAS  TMINV39   000141
         *+5.0D0)*T*RN**4/24.0D0                                           TMINV40   000166
          B(5)=((TS-21.0D0*ETAS+8.0D0)*TS+ETAS*6.0D0+5.0D0)*B(1)*           TMINV41   000172
         *RN**4/120.0D0                                                    TMINV42   000225
          B(6)=(((TS*45.0D0-45.0D0)*TS+ETAS*162.0D0-90.0D0)*TS             TMINV43   000231
         *-ETAS*107.0D0-61.0D0)*T*RN**6/720.0D0                            TMINV44   000231
          B(7)=-((TS-720.0D0+1320.0D0)*TS+662.0D0)*B(1)*RN**6/             TMINV45   000245
         *5040.0D0                                                         TMINV46   000245
          B(8)=(((TS-1575.0D0+4095.0D0)*TS+3633.0D0)*TS+1385.0D0)*T*RN**8/ TMINV47   000262
         *40320.0D0                                                        TMINV48   000262
          B(10)=B(9)*B(9)                                                   TMINV49   000265
          SLAT=(((B(8)*B(10)+B(6))*B(10)+B(4))*B(10)+B(2))*B(10)+B(11))*    TMINV50   000277
         *206264.8062470964D0                                              TMINV51   000277
          SLON=(((B(7)*B(10)+B(5))*B(10)+B(3))*B(10)+B(1))*B(9)*           TMINV52   000277
         *206264.8062470964D0 + A(9)                                        TMINV53   000315
C
C         COMPUTE SCALE FACTOR (SK)
C
          BN=B(9)*RN                                                        TMINV54   000317
          BNS=BN**2                                                         TMINV55   000317
          SK=1.0D0+((1.0D0+ETAS)/2.0D0)*BNS+(1.0D0+6.0D0*ETAS+9.0D0         TMINV56   000317
         X*ETAS*ETAS+4.0D0*ETAS*ETAS*ETAS-24.0D0*ETAS*ETAS*TS-24.0D0        TMINV57   000366
         X*ETAS*ETAS*TS)*BNS*BNS/24.0D0+(BNS*BNS*BNS)/720.0D0
          SK=SK*A(8)
C
C         COMPUTE CONVERGENCE ANGLE (THET)
C
          THET=((((((-24.0D0*ETAS-27.0D0)*ETAS-7.0D0)*ETAS+1.0D0)*ETAS)*TS  TMINV59   000366
         X)+(5.0D0*TS+3.0D0*TS**2)+(((11.0D0*ETAS+20.0D0)*ETAS+9.0D0)*      TMINV60   000370
         XETAS+2.0D0*ETAS)+2.0D0)*(BN-5)*T/15.0D0)+(T*BN)-(((45.0D0*TS      TMINV61   000370
         X+105.0D0)*TS+17.0D0)*((BN**7)/T/315.0D0)-(((1.0D0+TS             TMINV62   000370
         X-ETAS-2.0D0*ETAS**2)*BN**3)*T/3.0D0)                             TMINV63   000370
          THET=-THET*206264.8062470964D0                                    TMINV64   000472
          GOTO 9999                                                         TMINV65   000470
C
C         SET ERROR CODES
C
C
C         GRID DISTANCE FROM CENTRAL MERIDIAN > 0.2*SEMIMAJOR AXIS
C
```

```
00152   96*   8000 JERR=17                                    000472
00153   97*        GO TO 9000                                 000473
00153   98*   C                                               000473
00153   99*   C        RECTIFYING LATITUDE > 1.47 RAD.        000473
00153  100*   C                                               000473
00154  101*   8020 JERR=18                                    000475
00155  102*        GOTO 9000                                  000476
00155  103*   C                                               000476
00156  104*   9000 SLAT=0.0D0                                 000500
00157  105*        SLON=0.0D0                                 000501
00157  106*   C                                               000501
00160  107*   C                                               000501
00160  108*   9999 RETURN                                     000503
00161  109*        END                                        000547
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** UTMFW ******

@FOR.S CVCOORD.UTMFW.TPF$.UTMFW
FOR S0E3-05/17/78-08:39:22 (0.)

SUBROUTINE JTMFW   ENTRY POINT 000436

STORAGE USED: CODE(1) 000471; DATA(0) 000074; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 DMF   001000

EXTERNAL REFERENCES (BLOCK, NAME)

0004 NERR4$
0005 NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
0001   000414 100L    0001   00C267 2L    0001   000075 4L      0001   C00102 5L
0001   000107 6L      0001   000114 7L     0003 D 000000 4       0000 D 000006 IL2
0000 D 000010 IL3     0000 D 00C012 IL4    0000 D 000014 IL5     0000 D 000016 IL6     0000 D 000020 IL7
0000   000047 INJP$   0000 D 000004 IP     0000 I 000022 K       0000 D 000000 PHIA    0000 D 000002 PHINOT
```

```
00101   1*        SUBROUTINE UTMFW (PHI,IL,N,INCE,$)              UTMF  002    000000
00103   2*        DOUBLE PRECISION A(4,8),PHI,IL,N,INCE,PHIA,PHINOT,IP,IL2,IL3,   UTMF  003    000000
00103   3*       *IL4,IL5,IL6,IL7                                 UTMF  004    000000
00104   4*        COMMON /CMF/ A                                  UTMF  004    000000
00105   5*        PHIA=DABS(PHI)                                  UTMF  005    000000
00106   6*        IF((PHIA.GE.0.0D0).AND.(PHIA.LT.7200.0D1))  GO TO 4    UTMF  006    000001
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        IF ((PHIA.GE.7200.0D1).AND.(PHIA.LT.144000.0D0))   GO TO 5
        IF ((PHIA.GE.1.4405).AND.(PHIA.LT.2.16D51))   GO TO 6
        IF ((PHIA.GE.2.16D5).AND.(PHIA.LT.2.69805))   GO TO 7
        IF (PHIA.GE.2.89805)              GOTO 100
    4   K=1
        PHINOT=3.6D4
        GO TO 8
    5   K=2
        PHINOT=1.0905
        GO TO 8
    6   K=3
        PHINOT=1.80C5
        GO TO 3
    7   K=4
        PHINOT=2.5205
    8   IL=IL+10.0D0-*(-5)
        IP=PHIA-PHINOT
        IL2=IL**2
        IL3=IL**3
        IL4=IL**4
        IL5=IL**5
        IL6=IL**6
        IL7=IL**7
        IP=IP*10.0D0-*(-5)
        IF (PH).EQ.0.0D0)                      GO TO 2
        N=A(K,1,1)+(IP*IL+(IP*IL-(A(K,2,1)+IP-(A(K,2,3)+IP-(A(K,2,4)+IP-
       *IP*(A(K,1,6)+IP-(A(K,1,7)+IP-(A(K,1,9))))+A(K,3,1)+IP-(IP-(IP-IL2-(IP-IL2-(IP-IL2-
       *(A(K,3,2)+IP-(A(K,3,3)+IP-(A(K,3,4)+IP-(A(K,3,5)+IP-(K,3,6)))))+A(K,3,6))+
       *IP-(A(K,3,7)+IP-A(K,3,8))))+A(K,5,1)-IL4+IP-IL4-(A(K,5,2)+IP-IL4+
       *IP-(A(K,5,3)+IL4+IP-(A(K,5,4)+IP-IL4-(A(K,5,5)+IP-IL4-(A(K,5,6))+
       *IP-(A(K,7,1)+IL6+(IP-IL6-(A(K,7,2)+IP-IL6-(A(K,7,3)+
       *IP-(A(K,7,4)+IP-A(K,7,5)))))
        GO TO 3
    2   N=0.0D0
    3   INCE=A(K,2,1)+IL+(IP-IL+(A(K,2,2)+IP-(A(K,2,3)+IP-A(K,2,4)+IP-
       *(A(K,2,5)+IP-(A(K,2,6)+IP-(A(K,2,7)+IP-A(K,2,8)))))+IP-
       *A(K,4,1)+IL3+(IP-IL3-(A(K,4,2)+IP-A(K,4,3)+IP-(A(K,4,4)+IP-
       *(A(K,4,5)+IP-(A(K,4,6)+IP-(A(K,4,7)+IP-A(K,4,8)))))+IP-
       *IL5+(IP-IL5-(A(K,6,2)+IP-(A(K,6,3)+IP-(A(K,6,4)+IP-(A(K,6,5)+IP-
       *(A(K,6,6)+IP-A(K,6,7))))))+A(K,8,1)-IL7+(IP-IL7-(A(K,8,2)+IP-
       *(A(K,8,3)+IP-(A(K,8,4)+IP-A(K,8,5)))))
        IF (PHIJ.LT.0.0D0) N=-N
        RETURN
  100   RETURN
        END
```

END OF COMPILATION: NO   DIAGNOSTICS.

@HDG.P ****** UTMIVS ******

@FOR.S CVCOORD.UTMIVS,TPFS.UTMIVS
FOR S0E3-05/17/78-08:39:46 (0.)

SUBROUTINE UTMIVS   ENTRY POINT 000000

```
@MISD.LIBS.LFOR.S   CVCOORD.UTMIVS.TPF$.
FOR 00E3-05/17/78-17:50:59 (0.)


SUBROUTINE UTMIVS    ENTRY POINT 000572

STORAGE USED: CODE(1) 000623; DATA(0) 000064; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003   OMI     003410

EXTERNAL REFERENCES (BLOCK. NAME)

0004   NERR4$
0005   NERR3$

STORAGE ASSIGNMENT  (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001  000131 1L        0001  000350 10L      0001  000551 100L     0001  000136 2L      0001  000143 3L
0001  000150 4L        0001  000155 5L       0001  000162 6L       0001  000166 8L      0001  000346 9L
0003 D 000000 B        0000 D 0C0004 DN      0000  000043 INJP$    0000 I 000006 K      0000 D 000000 NA
0000 D 000002 NAO

00101   1*       SUBROUTINE UTMIVS (N,IE,PHI,ILAM,$)
00103   2*       DOUBLE PRECISION N,IE,PHI,ILAM,B(6,10,15),NA,NAO,DN
00104   3*       COMMON /OMI/ B
00105   4*       NA=DABS(N)
00106   5*       IF ((NA.GE.0.0D0).AND.(NA.LE.2.2167D6))                      UTMI  002   000000
00110   6*       IF ((NA.GT.2.2167D6).AND.(NA.LE.4.5468D6))         GO TO  1UTMI  003   000000
00112   7*       IF ((NA.GT.4.5468D6).AND.(NA.LE.6.2137D6))         GO TO  2UTMI  004   000000
00114   8*       IF ((NA.GT.6.2137D6).AND.(NA.LE.7.4930D6))         GO TO  3UTMI  005   0C0001
00116   9*       IF ((NA.GT.7.4930D6).AND.(NA.LE.8.3835D6))         GO TO  4UTMI  006   000016
00120  10*       IF ((NA.GT.8.3835D6).AND.(NA.LE.8.9429D6))         GO TO  5UTMI  007   000034
00122  11*       IF (NA.GT.8.9429D6)                                GO TO  6UTMI  008   000052
00124  12*                                              GOTO 100              UTMI  009   000070
00125  13*     1 K=1                                                          UTMI  010   000106
00126  14*       NAO=1105343.10DC                                                   011   000124
00127  15*     2 K=2                                                          UTMI  012   000131
00130  16*       NAO=3318605.326D0                                           UTMI  013   000132
00131  17*     3 K=3                                                GO TO  8UTMI  014   000134
00132  18*       NAO=5316081.344D0                                            UTMI  015   000136
00133  19*     4 K=4                                                                016   000137
00134  20*       NAO=6790430.383D0                                           GO TO  8UTMI  017   000141
00135  21*     5 K=5                                                          UTMI  018   000143
00136  22*       NAO=7877225.327D0                                            UTMI  019   000144
00137  23*     6 K=6                                                GO TO  8UTMI  020   000146
00140  24*       NAO=8602427.796D0                                            UTMI  021   000150
00141  25*                                                          UTMI  022   000151
00142  26*                                                GO TO  8UTMI  023   000153
00143  27*                                                          UTMI  024   000155
00144  28*                                                          UTMI  025   000156
                                                                     UTMI  026   000160
                                                                     UTMI  027   000162
                                                                     UTMI  028   000163
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........................ UTMIVS

00145  29*   8 DN=NA-NAO                                                      UTMI 029 000166
00146  30*     DN=DN*(1.00D-6)                                               UTMI 030 000170
00147  31*     IE=IE*(1.00D-6)                                               UTMI 031 000172
00150  32*     IF (N.EQ.0.0DC)                              GO TO 9UTMI 032 000175
00152  33*     PHI=B(K,1,1)+DN*(B(K,1,2)+DN*(B(K,1,3)+DN*(B(K,1,4)+DN*(B(K,1,5)+DUTMI 033 000200
00152  34*    *N*(B(K,1,6)+DN*(B(K,1,7)+DN*(B(K,1,8)+DN*B(K,1,9))))))+(IE**2)*(UTMI 034 000200
00152  35*    *B(K,3,1)+DN*(B(K,3,2)+DN*(B(K,3,3)+DN*(B(K,3,4)+DN*(B(K,3,5)+DN*UTMI 035 000200
00152  36*    *(B(K,3,6)+DN*(B(K,3,7)+DN*(B(K,3,8)+DN*(B(K,3,9)+DN*(B(K,3,10)+UTMI 036 000200
00152  37*    *DN*(B(K,3,11)+DN*B(K,3,12))))))))))+(IE**2)*(B(K,5,1)+DN*UTMI 037 000200
00152  38*    *(B(K,5,2)+DN*(B(K,5,3)+DN*(B(K,5,4)+DN*(B(K,5,5)+DN*(B(K,5,6)+DN*UTMI 038 000200
00152  39*    *(B(K,5,7)+DN*(B(K,5,8)+DN*(B(K,5,9)+DN* B(K,5,10))))))))+(IE**2)*UTMI 039 000200
00152  40*    *(B(K,7,1)+DN*(B(K,7,2)+DN*(B(K,7,3)+DN*(B(K,7,4)+DN*(B(K,7,5)+DN*UTMI 040 000200
00152  41*    *(B(K,7,6)+DN*(B(K,7,7)+DN* B(K,7,8)+DN*(B(K,7,9))))))+(IE**2)*UTMI 041 000200
00152  42*    *(B(K,9,1)+DN*(B(K,9,2)+DN*(B(K,9,3)+DN*(B(K,9,4)+DN*(B(K,9,5)*UTMI 042 000200
00152  43*    *DN*B(K,9,6)))))))                                             UTMI 043 000344
00153  44*                                                    GO TO 10UTMI 044 000344
00154  45*   9 PHI=0.0D0                                                      UTMI 045 0C0346
00155  46*  10 ILAM=IE*(B(K,2,1)+DN*(B(K,2,2)+DN*(B(K,2,3)+DN*(B(K,2,4)+UTMI 046 000350
00155  47*    *DN*(B(K,2,5)+DN*(B(K,2,6)+DN*(B(K,2,7)+DN*(B(K,2,8)+DN*(B(K,2,9)+UTMI 047 000350
00155  48*    *DN*(B(K,2,10)+DN*(B(K,2,11)+DN*(B(K,2,12)+DN*(B(K,2,13)+DN*(B(K,2,UTMI 048 000350
00155  49*    *14)+DN*B(K,2,15))))))))))))+(IE**2)*(B(K,4,1)+DN*(B(K,4,2)+UTMI 049 000350
00155  50*    *DN*(B(K,4,3)+DN*(B(K,4,4)+DN*(B(K,4,5)+DN*(B(K,4,6)+DN*(B(K,4,7)+UTMI 050 000350
00155  51*    *DN*(B(K,4,8)+DN*(B(K,4,9)+DN*(B(K,4,10)+DN*B(K,4,11)+UTMI 051 000350
00155  52*    *DN*(B(K,4,12)+DN*B(K,4,13))))))))))+(IE**2)*(B(K,6,1)+DN*(B(K,6,UTMI 052 000350
00155  53*    *2)+DN*(B(K,6,3)+DN*(B(K,6,4)+DN*(B(K,6,5)+DN*(B(K,6,6)+DN*(B(K,6,7UTMI 053 000350
00155  54*    *)+DN*(B(K,6,8)+DN*(B(K,6,9)+DN*(B(K,6,10)+DN*B(K,6,11))))))))))+UTMI 054 000350
00155  55*    *(IE**2)*(B(K,8,1)+DN*(B(K,8,2)+DN*(B(K,8,3)+DN*(B(K,8,4)+UTMI 055 000350
00155  56*    *DN*(B(K,8,5)+DN*(B(K,8,6)+DN*(B(K,8,7)+DN*(B(K,8,8)+UTMI 056 000350
00155  57*    *DN*B(K,8,9))))))))+(IE**2)*(B(K,10,1)+DN*(B(K,10,3)+DN*UTMI 057 000350
00155  58*    *DN*(B(K,10,4)+DN*(B(K,10,5)+DN*(B(K,10,6)+DN*B(K,10,7))))))))     UTMI 058 000350
00156  59*     IF (N.LT.0.0D0) PHI=-PHI                                        UTMI 059 000537
00160  60*     RETURN                                                          UTMI 060 000545
00161  61* 100 RETURN 5                                                        UTMI     000551
00162  62*     END                                                        UTMI 062 000622
```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ******************************** ZONE2

@FOR.S   CVCOORD.ZONE2.TPF$.
FOR S0E3-05/17/78-17:50:55 (0.)

SUBROUTINE ZONE2   ENTRY POINT 000043

STORAGE USED: CODE(1) 000064; DATA(0) 000062; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003   NERR4$
0004   NERR3$

@F1:FOR.S CVCOORD.ZONE2.TPF$.
FOR S0E3-10/24/78-16:14:54 (1.)

SUBROUTINE ZONE2   ENTRY POINT 000043

STORAGE USED: CODE(1) 000064; DATA(0) 000101; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003   NERR4$
0004   NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001   000002 120G   0001   000014 333L   0000 R 000041 HSIGN1   0000 R 000054 HSIGN2   0000 I 000000 IALF
0000   000070 INJP$ 0000 I 000013 ISZ   0000 I 000026 IUZ   0000 I 000067 J

```
 1*          SUBROUTINE ZONE2 (INST,H1,H2,UZONE,SZONE,$)
 2*    C     THIS SUBROUTINE RETURNS HEMISPHERE INDICATORS
 3*    C                             UTM ZONE NUMBER
 4*    C                             STATE ZONE NUMBER
 5*    C             USING 2-LETTER INSTALLATION CODE AS INPUT
 6*    C
 7*    C
 8*    C
 9*    C     SEP 1978  -  ADDED CODES FOR AL, HA, LS, VO
10*    C
11*    C     INSTALLATIONS:
12*    C     -------------
13*    C
14*    C             AL    ALABAMA AAP
15*    C             BA    BADGER AAP
16*    C             EA    EDGEWOOD AREA   (APG)
17*    C             FA    FRANKFORD ARS
18*    C             HA    HAWTHORNE NAD
19*    C             LS    LONE STAR AAP
20*    C             P3    PINE BLUFF ARS
21*    C             RA    REDSTONE ARS
22*    C             RM    ROCKY MT ARS
23*    C             VO    VOLUNTEER AAP
24*    C             WS    WELDON SPR CP
25*    C
26*    C
27*          INTEGER IALF(11),ISZ(11),IUZ(11),SZONE,UZONE
28*          REAL    HSIGN1(11),HSIGN2(11)
29*          DATA    HSIGN1/11*1HN/
30*          DATA    HSIGN2/11*1HN/
31*          DATA    IALF/2HBA,2HEA,2HFA,2HHA,2HP3,2HRA,2HRM,2HWS,2HAL,2HLS,
32*         1        2HVO/
33*          DATA    ISZ/5751,4126,5151,4651,3251,3101,3451,4401,3101,5351,
34*         1        5301/
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```
00115    35*        DATA    IUZ/+16,+18,+18,+11,+15,+16,+13,+15,+16,+15,+16/    000002
00115    36*    C                                                              000002
00115    37*    C                                                              000002
00115    38*    C                                                              000002
00117    39*           DO 100 J=1,11                                           000002
00122    40*           IF (INST.EQ.IALF(J))    GOTO 333                        000002
00124    41*    100 CONTINUE                                                   000007
00124    42*    C                                                              000007
00124    43*    C       ERROR RETURN                                           000007
00126    44*    C                                                              000007
00126    45*    C       RETURN 6                                               000007
00127    46*    C                                                              000007
00127    47*    333 H1=HSIGN1(J)                                               000014
00130    48*           H2=HSIGN2(J)                                            000016
00131    49*           UZONE=IUZ(J)                                            000020
00132    50*           SZONE=ISZ(J)                                            000022
00132    51*    C                                                              000022
00132    52*    C                                                              000022
00133    53*    9999 RETURN                                                    000024
00134    54*           END                                                     000063
END FOR
```

@RESUME.P XEROX.8